EXECUTIVE SUMMARY

of

Environmental Impact Assessment & Environmental Management Plan

for

Proposed Expansion of Rehar UG Coal Mining Project

(0.31 MTPA to a Peak Production Capacity of 0.80 MTPA and Expansion in Mine Lease Area from 408.200 Ha to 462.888 Ha)

at

Getra Village, Surguja District, Chhattisgarh

Submitted by

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Executive Summary

1. Introduction

The purpose of Environmental Impact Assessment (EIA) is to evaluate the potential environmental effects and is a planning tool for assessing the environmental concerns of a mine at an early stage of mine planning and design, so that it can assure the mine is environmentally feasible. The present proposal is to extract coal reserves of 8.32 MT by underground mining by Bord and Pillar method i.e., Side Discharge Loaders (SDLs) and Load Haul Dumpers (LHDs), up to a maximum depth of 100 m. with an estimated capital outlay of Rs. 29.9055 Crores. The estimated life of the mine will be 12 years. The Rehar is an expansion underground project for 0.55 MTPA with normal production to a peak production of 0.80 MTPA. The total mine take area for the mine is 462.888 Ha. The purpose of the present mine is to meet the part of the ever increasing coal demand and to reduce the gap to the extent of its rated capacity by 0.80 MTPA.

Detailed baseline data as per CPCB guidelines has been collected within 10 Km radius of the block area. The baseline data has been collected for pre-project environmental status during 2009 to February 2010 for one season i.e., Winter season.

2. Description of the Project

The project is classified as category "A" under the MoEF notification dated 14th September 2006 and involves mining of coal in an area of 460 Ha. The proposed expansion of Rehar underground mining project is located near Getra Village, Surguja district. It comes under the Rehar West geological block of Bishrampur Coalfields. It lies within North latitude $23^0$05'15" to $23^0$07'30" and East longitudes $82^0$55'32" and $82^0$56'53" covered in survey of India Toposheet No.64 I/16. The brief details regarding the magnitude of operations are as given below.

Sl.No	Description	Details
1.	Method of Mining	Under Ground Mining by Bord & Pillar method with Intermediate Technology
2.	Mine Take area	462.888 Ha.
3.	Total forest land in core area	114.978 Ha.
4.	Capital Cost of the mine	Rs. 29.9055 Crores
5.	Geological Reserves	14.13 Million Tones
6.	Extractable Reserves	8.32 Million Tones
7.	Quantity of coal extracted till 31.03.09	1.67 Million Tones
8.	Quantity of coal to be extracted	6.65 Million Tones
9.	Maximum Depth of the mine	100 m
10.	Existing Capacity	0.31 MTPA
11.	Proposed Peak Production	0.80 MTPA (Normal 0.55 MTPA)

3. Description of the Environment

Detailed studies have been conducted during the winter season in respect of air, water, land and soil in core zone and buffer zone. The baseline data conforms to the requirement of EIA Notification, 2006 (as amended on 14.09.2006).

3.1 Baseline Environment Status

Physiography and Drainage

The ground elevation ranges between 536m to 562m above mean sea level within the mine block. The topography of the area is generally flat and undulating at few places. Jobga Nalla (tributary of Rehar River) flows at SE Direction of the mine block and these two rivers such as Jobga and Rehar are the main drainage systems of the project area.

Meteorology (Climate)

Project area falls under the hot temperate climate zone and hence it experiences very hot and dry. Summer season starts from April and stays to mid June. Rainy season due to the South-West Monsoon is from mid June till the end of September. During study period (winter season – Dec, 2009 to Feb 2010) the most predominant wind direction recorded was from N and the average 24-hour wind rose diagram reveals that calm conditions prevailed predominantly for 10.79 % of the total time.

Air Environment

Air pollution parameters like Respirable Particulate Matter (RPM), Suspended Particulate Matter (SPM), Sulphur Dioxide (SO_2), and Nitrogen Oxides (NO_x) were identified as related to the mining activities for representing baseline status of ambient air quality within the study area. To assess the base line ambient quality, eight air quality monitoring locations were selected one in core and seven in buffer zone area.

Air Quality Status

In the study area, the SPM concentration varies from 263 µg/m^3 to 68 µg/m^3 and the RPM concentration varies from 105.2 µg/m^3 to 21 µg/m^3. SO_2 and NO_x concentration is found to be in the range of 6.2 to 24.6 µg/m^3 and 8.4 to 31.3 µg/m^3 respectively. All the heavy metals concentrations are found to be BDL (Below Detectable Limits). The air quality parameters of all identified sampling stations of the study area are within the standards of CPCB, which are stipulated for industrial, residential and rural areas.

Noise Environment

Noise levels were measured for 24 hours on hourly basis by using a precision integrating microcomputer controlled sound level meter at four locations within the study area. The noise levels observed during day time and night time in the four locations are within the stipulated standards.

Land Environment

Total land involved in the expansion of Rehar UG mine activities has been given below:

Type of land	Land in Ha.
Forest land	114.978
Road	7.567
Barren land	6.900
Pond	2.063
Agriculture land	331.380
Total land involved	**462.888**

Land Utilization Pattern of the Study Area is given below

Category	10 Km Periphery from site		5 Km Periphery from site	
	Area in Ha.	%Cover	Area in Ha.	%Cover
Settlements	2037	4.8	570	5.3
River	521	1.2	104	1.0
River Sand	1180	2.8	295	2.7
Double crop	3533	8.3	1131	10.5
Single crop	20266	47.6	5067	46.8
Dense forest	579	1.4	347	3.2
Scrub forest	1628	3.8	293	2.7
Forest Blank	2135	5.0	790	7.3
Decedeous forest	6230	14.6	1308	12.1
Land without scrub	892	2.1	205	1.9
Land with scrub	3242	7.6	648	6.0
Barren land	155	0.4	8	0.1
Tanks/ponds	204	0.5	31	0.3
Total	**42602**	**100**	**10797**	**100**

Soil Quality

The nutrients covered are Sulphates, Calcium, Magnesium, Potassium and Phosphorous for delineation to the soil fertility. The pH of the soil samples analysed in the study area is found to be moderately alkaline in nature. From the results it is observed that the nutrients and organic matter levels are sufficient amounts in all locations when compared standard soil classification, which was given by Indian Council for Agricultural Research (ICAR), therefore, the soils are conducible to nutrient supplying capacity for the growth of different species, which are commonly found in the region.

Water Environment

The impact of the proposed mine on the water environment is assessed by studying the water quality of ground water and surface water bodies sources within the study area. The major water source in the area is ground water. The sampling stations were identified considering the proximity to project site and its effect on the water quality. Twelve number

of water samples i.e., four samples from surface water sources and eight from ground water bodies are collected and the samples are analyzed for various physico-chemical parameters.

The surface water sample analysis results are compared with the tolerance limits for inland surface water bodies (IS 2296 -1982), Class C i.e., water source fit for drinking with conventional treatment followed by disinfection. From the results, it is found that all the parameters are all well within the standards. The ground water quality results are compared with drinking water standards (IS: 10500), therefore all the values are within the limits of stipulated standards.

3.2 Ecological Resources

There is 114.978 Ha of forestland within the core zone. The habitat is well maintained with artificial rising of plants around the Core area with natural forest species. The forestland in Buffer zone is dry deciduous mixed forest comprises vegetation in dense patches, scrubs and type formations.

There are no endangered or endemic species of flora and fauna in core and buffer zone of the proposed project.

3.3 Socio-economic Environment

There are 62 villages present within 10km area around the periphery of the proposed mine. The total population within the study area of 10km radius is 80,837 out of which, the main inhabitants are tribes, who constitute the majority (41.1%) of the total population.

The literacy rate is about 47.31% in the study area. The total workers population in the area is about 47.4% which include both main and marginal workers.
The most common diseases in the area are Malaria, Filarial, Diarrhea and Fever. This shows that there is no disease related to industrial pollution like dust emission, contaminated water discharge etc. Total 8 primary health centres are available in the study area.

4. Anticipated Environmental Impacts and Mitigation Measures

The section summarizes the pollution potential of the proposed mine, it's possible impacts on the surrounding environment during pre-operational and operational phases and the necessary management actions proposed for control and abatement of pollution.

4.1 Impacts due to Air Pollution and its Mitigation

The dust pollution control measures suggested are more as preventive measures because the generation or emission is not through stacks but from various mining activities. The following measures are proposed:

- ✓ Effective water spraying arrangements in underground working places as well as at coal loading bunkers at pithead on surface.
- ✓ The unmetalled roads shall be kept free of ruts, pot-holes etc. No-overloading of vehicles will be permitted to prevent spillage and additional dust generation.
- ✓ Limiting the speed of vehicles to reduce the generation of dust. Regular maintenance of vehicle to limit emission of harmful exhaust fumes.
- ✓ Water spraying arrangement along coal transport route within the mine premises.
- ✓ Clearing off coal dust heaps on surface.
- ✓ Black topping of coal transport route.
- ✓ Watering of roads at regular intervals
- ✓ Plantation within the mine premises and also along coal transport route
- ✓ Trucks carrying coal will be covered with tarpaulin.
- ✓ The underground workings of the mine will be well ventilated by adequate ventilation arrangements. The requirements and standards specified in this regard by Director General of Mines Safety (DGMS) would be adhered to.

4.2 Impact due to Water Pollution and its Management

Normally a part of the mine discharge water pumped out from the mine will be re-utilised for industrial purposes like for plantation and drinking water supply at the mine. It is estimated that 2921 KLD of water will be pumped out from the mine. Out of this 486 KLD will be used for consumption at the mine level for dust suppression and green belt development and 35 KLD for domestic consumption at mine. The balance 2400 KLD from mine discharge will be collected in settling ponds for settlement of suspended sediments and no wastewater will be discharged directly in to the drainage system.

The following mitigate measures are proposed to reduce the magnitude of the undesirable impacts:

- ✓ The mine discharge water, which may contain coal fines, needs sedimentation, before discharge into the natural water course/ open land. The treatment facilities such as sedimentation, filtration and chlorination will be provided for mine discharge, so as to conform to the effluent standards as prescribed by Ministry of Environment & Forests.
- ✓ The service building effluents will be collected by a sewerage system and treatment by means of septic tanks and soak pits. There will not be any impact as the treated sewage is discharged after treatment.
- ✓ The excess mine water, which is proposed to be discharged into nearby tanks can be used by local villagers for agricultural purpose. This is also augment recharge of the ground water regime. As there is surplus amount of water is available within the ground water table, there will not be any significant impact on the ground water table.
- ✓ The results of studies conducted by SECL on the impact mining on water resources revealed that there is no impact of mining on ground water regime in the mining areas.

The present stage of ground water development within buffer zone of study area is 48.27%. Based on this data, this area is categorized as "**Safe**".

The ground water levels in dug well were monitored in pre-monsoon and post-monsoon season in wells located within 10 km radius from the proposed mine. The records show the minimum pre-monsoon water level is 4.55 m.b.gl and maximum 10.7 m.bgl. Whereas, during post-monsoon the minimum water level has gone to 0.90 m.bgl (1999) and maximum to 6.25 m.bgl (1998). The ground water fluctuates between 2.15 m.bgl to 7.74 m.bgl in the block, whereas, annual water level fluctuation is 4.76 m.bgl.

The results of studies on impact mining on water resources revealed that there is no impact of mining on ground water regime in the mining areas.

4.3 Impact due to Noise and its Management

The following noise control measures are proposed to be taken up in the mine for mitigating noise pollution.

- ✓ The main mechanical ventilators (MV Fans) will be provided which dampens the noise
- ✓ Properly designed plant and machinery (i.e. by providing inbuilt mechanisms like silencers, mufflers, and enclosures for noise generating parts) and shock absorbing pads at the foundation of vibrating equipment will be provided.
- ✓ Height of fall would be minimized at all coal transfer points and internal lining of bins and chutes would be done.
- ✓ In the high noise intensity working areas / zones earmuffs or earplugs or any other suitable personal protective equipment would be provided to the workmen.
- ✓ Regular noise level monitoring would be done periodically for taking corrective action, wherever required.
- ✓ Management of manpower working in high noise level areas such that the assignment is distributed amongst more persons thereby reducing individual exposure to high noise level to fewer hours in a shift and maintaining equivalent noise level exposure a shift to acceptable limit.
- ✓ Provision of isolator for vibrating equipment (both fixed and mobile) foundation.
- ✓ Extensive plantation of green belt and vegetation along the roads and around the offices to create a barrier or screen between the source and the receiver so that the noise is absorbed and the exposure level is minimized.

4.4 Impact on Land and its Management

Total mine take area is 462.888 Ha. As it is an underground mine to extract coal from the depth of 100 m. The surface land over the mine take area may likely to be affected due to subsidence.

Subsidence is expected to occur in the area where seam is occurring at the shallow depth. However, there will be no adverse effects of subsidence on the surface features and vegetation due to the underground mining operation in Rehar UG project.

Plantation Program

The plantation program will be designed within the natural constraints of the site and in particular species selection will reflect the flora known to be resistant to the local conditions.

Plants will be grown-

- Around fan house
- Along the approach roads and within the mine premises.

The native plants and mixed species will be planted. SECL maintains a well-established forestry department to carry on the Afforestation program over the mining areas and in the residential colonies in all the areas of the company. Greenbelt will be developed in phased manner after acquisition of land.

4.5 Solid Waste and its Management

The solid waste generated from this mine mainly consists of shale and sand stone and solid waste generated from colonies and service buildings. This material will be dumped in the low lying areas in the adjoining SECL lands and suitable plantation will be taken up over the same.

The domestic solid waste collected will be transported to the secure landfill disposal sites. The solid waste disposal sites are identified in the low-lying areas, over burden dumps and subsidence areas of SECL. Hence, no appreciable impact is anticipated due to disposal of solid wastes.

4.6 Impact on Socio-Economic Environment

No R & R is involved in this project.

The mine is expected to yield a positive impact on the socio-economic environment. It helps sustain the development of this area including further development of infrastructural facilities.

The proposed expansion mining activity of Rehar UG mine can have beneficial impact on socio-economic front. Total indirect employment potential due to the handling operations and ancillary units, suppliers, contractors are expected to provide job opportunities to several people in the region.

5. Alternatives

Coal mines are site specific in nature and location of the proposed area is restricted to the geology and coal deposition of the area. Safety, economical and technical constraints determine the mining methods to be employed. Considering gradient of the seams, depth of seams and evaluating different options, underground mining with Bord and Pillar method using intermediated technology has been finalized for this mine.

6. Environment Management Program

Environmental Monitoring Programme has been prepared for the proposed expansion of Rehar mine for assessing the efficacy of implementation of Environment Management Plan and to take corrective measures in case of any degradation in the surrounding environment.
Different activities involved in the proposed underground coal mine and their impact on various environmental attributes have been taken in to account while designing a detailed environmental monitoring programme for the mine.

Methodology of Monitoring Programme

Implementation of EMP and periodic monitoring is proposed to be carried out at (a) mine level and (b) area level for Rehar mine and allied activities like coal handling facilities, workshop, mining colony, etc.

Mine level environmental protection measures like subsidence monitoring & management, dust suppression, treatment and recycling of waste water, plantation and noise control in the mine premises, housekeeping, implementation of EMP and Environmental Clearance conditions will be monitored by the mine authorities.

Post project monitoring plan

To monitor the extent of environmental impact of the proposed mine, the various pollutants generated during mining operations will be periodically monitored. The detailed post project monitoring plan to be performed and linkages to impacts and mitigation measures identified in the environmental assessment has been prepared.

7. Additional Studies

7.1 Risk Assessment

Mining and allied activities are associated with several potential hazards to both the employees and the public at large. Hence, mine safety is one of the most essential aspects of any working mine. Indeed safety of the mine and the employees is taken care of by the Mines Act 1952.

Quantitative Risk Assessment (QRA) provides with a number of methodologies for assessing identified risks. Some of the likely hazards which can create disaster in underground mines are Mine gases, Side fall, Blasting, Mine fires and spontaneous combustion, Explosion in the mine, Subsidence, Inundation.

7.2 Disaster Management Plan

Mining operations in general have tremendous potential for hazards and disasters during various operations. Manager having workings belowground prepares general plan of action for the use in case of fire, explosion or other emergency occurs under the Mines Rescue Rules, G.S.R. 492(E) 3rd July, 1984 published as required by sub-section (1) of section 59 of

the Mines Act, 1952 (35 of 1952). The plan will provide the duties and responsibilities of each mine official and key man including telephone operators.

8. Project Benefits

Coal mining and agriculture is the basic sector of employment for the local people in this area. This mine will lead to indirect employment opportunity. Employment is expected in trade, garbage lifting, sanitation and other ancillary services, Employment in these sectors will be primarily temporary or contractual and involvement of unskilled labour will be more. A major part of this labour force will be mainly from local villagers who are expected to engage themselves both in agriculture and mining activities. This will enhance their income and lead to overall economic growth of the area.

The proposed mine is likely to have other tangible benefits as given below.

- ✓ Indirect employment opportunities to local people in contractual works like transportation, sanitation, for supply of goods and services to the mine and other community services.
- ✓ Additional housing demand for rental accommodation will increase.
- ✓ Market and business establishment facilities will also increase.
- ✓ Cultural, recreation and aesthetic facilities will also improve.
- ✓ Improvement in communication, transport, education, community development and medical facilities and overall change in employment and income opportunity.
- ✓ The State Government will also benefit directly from the proposed mine, through increased revenue from royalties, excise duty and etc.

9. Environment Management Plan

Environmental Management Plan (EMP) requires multidisciplinary approach. EMP can further be modified / upgraded time to time by taking advice from experts in the respective fields (forest, soil chemistry, groundwater etc.,) as the mining progresses. The EMP is required to ensure sustainable development in the study area, hence it needs to be an all encompassing plan for which the mine authorities, government, regulating agencies like CECB etc working in the region and more importantly the affected population of the study area need to extend their cooperation and contribution.

Mitigation measures at the source level and an overall management plan at the study area level are elicited so as to improve the supportive capacity of the receiving bodies. The EMP aims at controlling pollution at the source level to the possible extent with the available and affordable technology followed by treatment before they are discharged.

Environmental management for the present mining activity is being discussed. It is evident from the earlier discussions that the majority of the environmental impact pertains to the operational phase. Even though reversible in nature - all the impacts will be visible only

during operational phase. It is planned to take corrective measures to ensure that these effects are kept to bare minimum. Implementation of EMP and periodic monitoring is proposed to be carried out at both mine level as well as area level.

Mine level environmental protection measures like subsidence monitoring & management, dust suppression, treatment and re-use of wastewater, plantation, and noise control in mine premises and also housekeeping will be looked after by the mine level management.

9.1 Final Decommissioning Plan

Mining being a temporary venture must be closed after exhaustion of the minerals being exploited. Closing a mine without adequate planning of post mining activities may induce severe negative impacts on environment in the post closure stage.

Closing of mining operations involves numerous issues like reclamation and environmental protection, community issues, socio-economic consideration, planning for alternate use of available facilities, cost estimation and asset disposal. The mine closure plan has been aimed at rehabilitation of disturbed area, which is acceptable to local community as well as authority and also be cost effective for acceptance of the project proponent.

Monitoring

The monitoring of the mine closure plan is an essential requirement for review of the efficacy of the mine closure plan and to take corrective actions. The monitoring consists of measuring the air quality, water quality, preservation of landscape, aesthetic and other land use values as prescribed in the mine closure plan.

10. Conclusion

The industrial and economic growth of India depends to a large extent on coal, which is the prime source of energy. Chhattisgarh is one of the leading producers of coal with a share of 21% in India, which accounts for about 16% coal resources of the country. SECL has projected the total demand and production of coal as 133.35Mt and 110.00 Mt respectively in the year 2011-12. Therefore, to meet the increasing demand for the coal from various industries and to compensate the loss of production from the existing mines due to exhaustion of reserves, it is necessary that SECL has to expand the Rehar UG project of a target capacity increase from 0.31 MTPA to with a peak production 0.80 MTPA.

From the detailed analysis of the environmental impacts and the remedial measures proposed, it can be concluded that no significant deterioration in the eco-system is likely to occur due to the proposed expansion of underground mine. On the other hand, this mine is likely to have several benefits like improvement in indirect employment generation and economic growth of the area, by way of improved infrastructure facilities and better socio-economic conditions.