

# **M/S CHHATTISGARH MINERAL DEVELOPMENT CORPORATION LTD.**

## **EXECUTIVE SUMMARY OF ENVIRONMENTAL IMPACT ASSESSMENT AND ENVIRONMENTAL MANAGEMENT PLAN FOR SONDIHA COAL BLOCK TATAPANI-RAMKOLA COALFIELD DISTRICT SARGUJA, CHHATTISGARH (AREA : 810.00 Ha within ML)**

**JULY, 2011**

*Prepared by:*



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# EXECUTIVE SUMMARY OF EIA/EMP REPORT OF SONDIHA COAL BLOCK

## 1.0 INTRODUCTION

### 1.1 General background

Sondiha Coal Block has been allotted to M/s Chhattisgarh Mineral Development Corporation Limited vide allotment letter No. 13016/8/2007-CA-I dated 25.07.2007 by Ministry of Coal.

Sondiha coal block is a part of Tatapani-Ramkola coalfield. The coal block is located in north-eastern part of Surguja district, Chhattisgarh bordering Jharkhand, Madhya Pradesh and Uttar Pradesh. The rated capacity of mine is 1.00 MTPA of coal. The block shall be operated by opencast and underground method of mining. Rated capacity 1.00 MTPA of coal shall be achieved by opencast mining method from first year to 15<sup>th</sup> year. After 15<sup>th</sup> year the mine shall be operated both by opencast mining and underground mining. From 16<sup>th</sup> year onwards coal production from Opencast Mine shall be 0.75 MTPA and remaining 0.25 MTPA shall be produced from Underground Mine. The life of the opencast mine shall be 33 years and in total the life of the combined mine (opencast and underground) shall be 36 years.

### 1.2 Location and communication

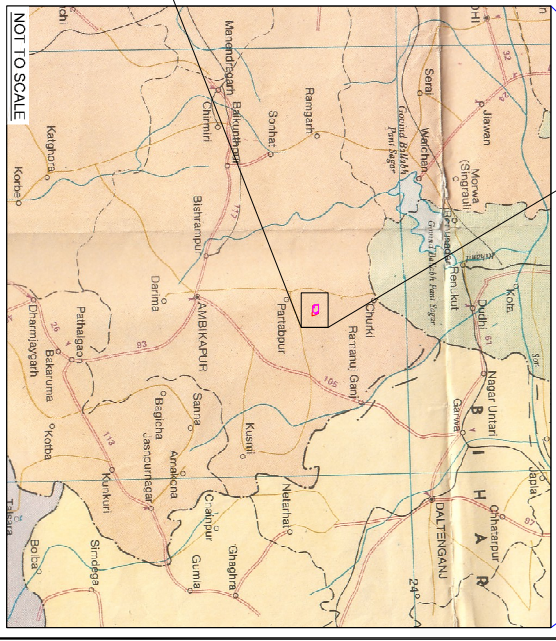
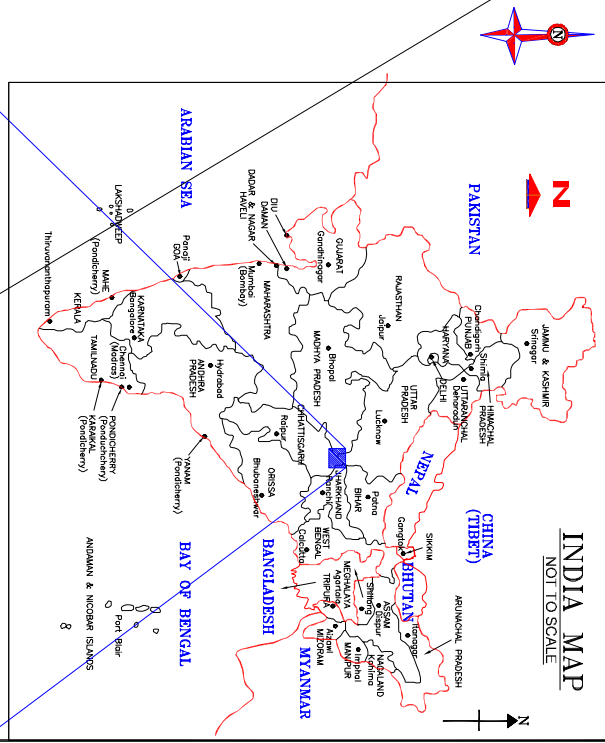
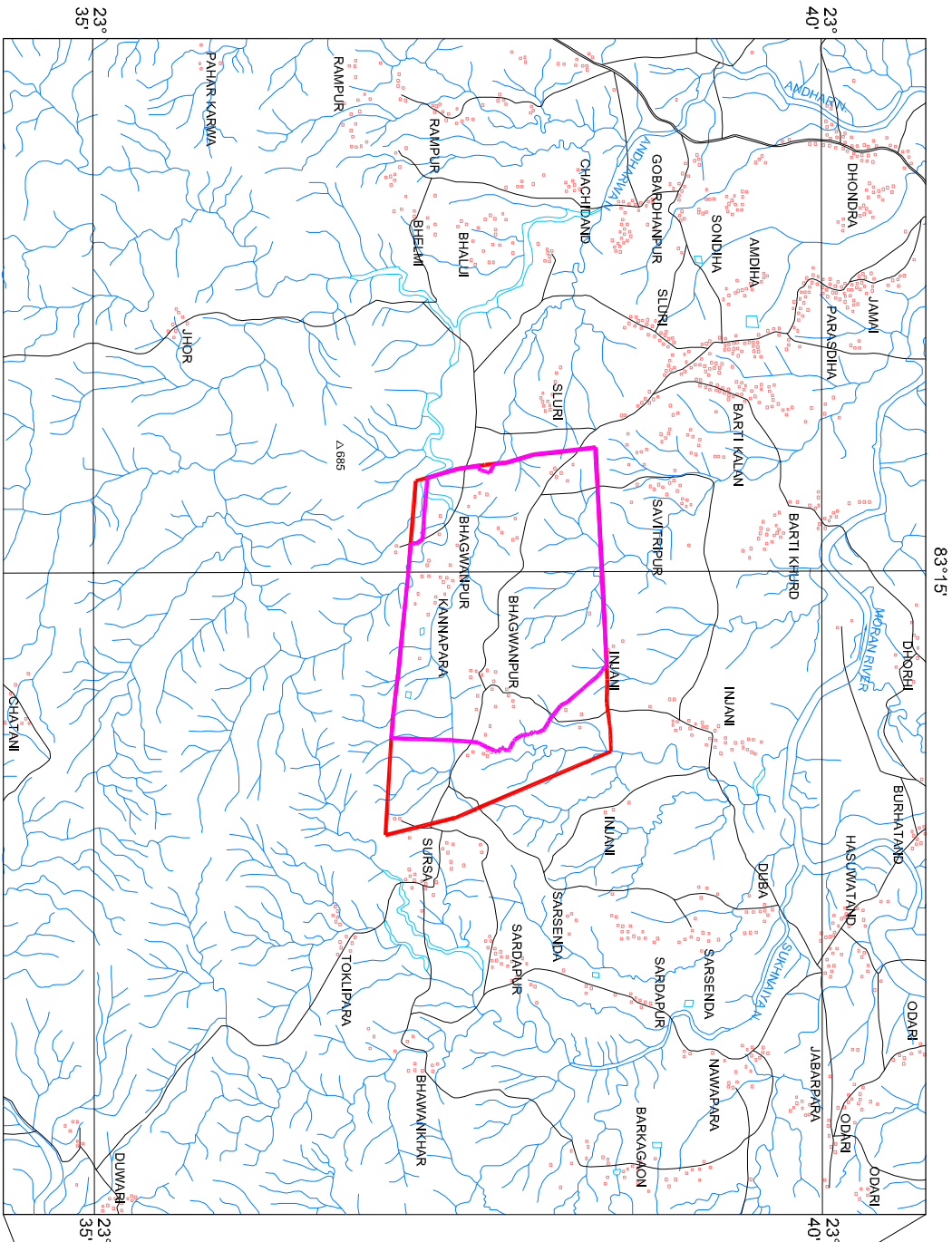
The applied mining lease area is 810 ha and falls in villages Bartikala, Sabitripur, Injani, Bhagabanpur Jirat and Bhagabanpur khas in Wadrunagar Taluka in Surguja district of Chhattisgarh. The area falls in the Survey of India Top sheet No. 64 M/2 and M/6 and lies between latitude 23° 37' 04.029" N to 23° 38' 32.836" N and longitude 83° 14' 06" E to 83° 16' 19.702" E. The location plan is given Fig 1.

The Sondiha block is approachable by a metalled road bifurcating from Ambikapur -Varanasi state highway which is 82 km from Ambikapur. The nearest railway station is Ambikapur at a distance of 80 km by road in East direction and the nearest air port is Muirpur airport at a distance of about 56 km, NNW.

## 2.0 PROJECT DESCRIPTION

### 2.1 Geology

The Tatapani-Ramkola Coalfield is a composite basin comprising a northern strip of coal bearing rocks, referred to as Tatapani Coalfield and a southern one named the Ramkola Coalfield.



- LEGEND**
- BLOCK BOUNDARY
  - APPLIED ML BOUNDARY
  - RIVER / NALA
  - ROAD
  - HABITATION
  - WATER BODY



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<p><b>PROJECT:</b> SONDIHA COAL BLOCK</p>		<p><b>CLIENT:</b> CMDCL</p>	
<p><b>TITLE:</b> SUMMARY</p>		<p><b>FIG. NO.</b> 1</p>	
<p><b>DRAWN BY:</b> B.R.MATILOTA</p>		<p><b>APPROVED BY:</b> B.D. SHARMA</p>	
<p><b>SCALE :</b> AS SHOWN</p>		<p><b>DATE :</b> 05-08-2011</p>	

SOURCE :- SOI I TOPOSHEET NO. 64-M-02 & 06

In Sondiha block subsurface data have established the presence of a complete Gondwana sequence from Talchir to Raniganj Formation overlying the Metamorphic Basement on surface and below the soil cover. Strata belonging to Talchir to Raniganj Formation except Barren Measure occur from south to north. The Barren Measures are not exposed in the block as the Barakar Formation abuts directly against the Raniganj Formation in north-eastern part of the block, along ESE-WNW trending fault. The major part of the block is covered by alluvial and sandy soil, laterite and clay. The block is affected by 20 faults.

## 2.2 Reserve estimation

In Sondiha block a total of 50.423 MT of net proved reserves have been estimated. It consists of 31.480 MT of opencast reserve (reserve of Seam VI, V, IVT and IVB/V) and 18.942 MT of underground reserve (reserve of Seams IVT, IVB/IV, III, II, I).

## 2.3 Mining

**Opencast mining:** The open cast mining has been envisaged in Sectors D, E, F, G, I and J upto the floor of Seam I. The shovel dumper combination of mining will be adopted. 8 m<sup>3</sup> Electric Hydraulic shovel with 100 tonnes rear dumpers will be used in overburden. It is proposed to use shovel of 1.5-2.0 m<sup>3</sup> backhoe in combination with 15 T R.D. dump Trucks for coal production. Mining will be started from the rise side and advance towards dip side. The total extractable coal reserve by OC method is 27.584 MT, amount of overburden is 380.394 MCum and overburden to coal ratio (13.79). It is estimated that a total of 2.55 Mcum (L) of top soil will be generated during the entire period of OC mining. The life of the OC mine will be about 33 years. The rated capacity of the mine shall be achieved by 2<sup>nd</sup> year. Mining and transport of coal and OB will be fully mechanised. The mine will operate 300 days in a year and 3 shifts per day.

**Underground mining:** It has been found that only seam-IV Top and IV-Bottom seams are viable for working through underground mining. The under ground mining will be carried out by two pairs of inclines from surface. The net mineable reserves by UG mining after delineating the mineable area (after deducting all the blocked reserves due to various reasons) comes to 8.597 MT. The overall % of extraction is considered as 60% of the mineable reserve. The extractable reserve therefore will be 5.159 MT. For working thicker areas (>1.5m), it is proposed to develop by simple Board and Pillar mining method with solid blasting. Coal loading shall be by using low height side dumps loaders or LHDS along with chain/belt conveyor during inclines drivages and panel developments as gradient is gentle for the two coal seams. It is proposed to open up at least three panels in the strike of which two panels will give regular production. The target is kept 0.25 MTPA. The life of the mine will be 21 years (with production commence from 16<sup>th</sup> year to 36<sup>th</sup> year). Additionally, there will be construction activities for 2 years prior to start of production.

## **2.4 Transportation**

The surface transport of coal at Sondiha Coal Block will be done by Coal Tippers to the pit head stockpile. The OB will be transported by dumpers to the surface dumps and backfill dumps.

## **2.5 Blasting**

In opencast mining, the blasting operations shaking blast practices are proposed using low powder factor. Heavy ANFO explosive is proposed and the average daily requirement will be 13.62 t/day. In underground development and depillaring, blasting off solid with permitted explosive P5 will be done. The daily requirement will be about 333 kg.

## **2.6 Site services**

Garage-cum-workshop-cum-engineering store is meant for regular repairs and maintenance of earth moving equipment and dumpers etc. for quarry operation. Provision for colony for about 50% manpower has been made. The colony is proposed to be located at Bhagwanpur village with in the block boundary. An underground 50 KL diesel pump will be established at the mine site. A 10.0 T capacity magazine will be provided within the ML area.

Total requirement of water for mining and allied activities are estimated as 1103 m<sup>3</sup>/day. Out of this the requirement of 458 m<sup>3</sup>/day potable water will be met from bore well and the rest industrial water requirement will be met from mine sump and surface water reservoir.

The power line of 11 KV will be drawn from nearest sub station to the local sub-station from where the power will be supplied to the mine and other functional buildings.

## **2.7 Manpower**

The total manpower requirement will be 1385 persons that includes 468 for Opencast and 927 for underground mining activities.

## **3.0 PRESENT ENVIRONMENTAL SCENARIO**

### **3.1 Topography and drainage**

The maximum height of the ground above mean sea level in the core zone is 526.03 m in central part and minimum is 426.12 m near central part of northern boundary. The study area represents hilly and undulating terrain with regional slope towards NNW in the area located north of the lease hold and diversified land slope direction in the south of leasehold.

The drainage pattern of the core zone is dendritic. Various seasonal streams flow in the core zone which dries during the summer season. The

Moran River flowing in north of the block forms the principal drainage of the area. A number of small tributaries, Viz. Injani, Kennapar nala of this river, drain the terrain.

### **3.2 Climate and micro-meteorology**

The area exhibits tropical to semi-tropical climate and is characterized by an oppressive hot summer, a mild winter and well-distributed rainfall during the south-western monsoon season. The nearest meteorological station of IMD is at Ambikapur. The monthly mean of minimum temperatures ranges from 8.84°C in December to 25.30°C in May. The monthly mean of maximum temperature ranges from 22.64°C in January to 39.81°C in May. The average annual rainfall for the year 1994 to 2005 was 1418.0 mm.

The micro-meteorology was monitored at the site from March to May 2010. The temperature recorded as a minimum of 11.10°C and maximum of 41.50°C. Relative humidity varied as a minimum of 21% and maximum of 84% during the monitoring period. The wind speed varies from calm to 21.88 km/hr and the predominant wind direction was observed from N with 17.70% of occurrences.

### **3.3 Ambient air quality**

Ambient air quality was studied at eight locations, one in the core and seven in the buffer zone. PM 10 was found between 11 to 55  $\mu\text{g}/\text{m}^3$ , SPM was found to vary from 91 to 150  $\mu\text{g}/\text{m}^3$ ,  $\text{SO}_2$  from 5.1 to 15.5  $\mu\text{g}/\text{m}^3$  and  $\text{NO}_x$  from 8.1 to 23.0  $\mu\text{g}/\text{m}^3$  values are much on the lower side. The concentrations of  $\text{SO}_2$  and  $\text{NO}_x$  are considerably low compared to the 80  $\mu\text{g}/\text{m}^3$  NAAQS limit for residential, rural and other areas.

### **3.4 Water environment**

The entire core and buffer zone is drained by Moran River and its tributaries. The Moran River joins Maham River and confluence to Govind Vallabh Pant Sagar a dam on Rihand which is part of Son River. The entire basin is part of Lower Ganga basin. The ground water level in the pheratic aquifer varies from 3.66 to 16.5 m bgl during pre-monsoon and 1.59 to 10.37 bgl during post-monsoon period. The annual ground water resource of the study area is 26.77 MCM and the utilization is 4.98 MCM.

Water samples were collected from 5 ground water and 6 surface water in the study area. The review of chemical analysis results indicates that the water in the area is feebly alkaline. The ground as well as surface water is potable and the various parameters are well within the desirable limits for human consumption.

### **3.5 Landuse pattern and soil quality**

The total ML area of 810 ha, covering part of the 5 villages is mostly in the form of private agriculture land and Forest land. The study area falls in 3

Tehsils of Sarguja district. There are 57 villages in the study area. As far as buffer zone is concerned 39.74% of total area is under forest, area not available for cultivation is 11.28%, culturable waste land is 15.46%, unirrigated land is 31.84 % and irrigated area 1.69%.

Top soil samples were collected and analysed from core zone and buffer zone. The pH 5.19 and 5.27 shows that the soil is strongly acidic. The conductivity is normal. The soil has sufficient organic carbon. Available Nitrogen in soil was found very less. Available Phosphorous (P) was 0.2 mg/kg and 0.4 mg/kg in core and buffer zone respectively.

### **3.6 Noise and traffic density**

Noise monitoring was done at 8 locations and was found to be between 45.10 to 47.80 dB (A) during day time and 40.70 to 41.60 dB (A) during night time respectively. The traffic density survey was conducted on Ambikapur to Badrai Nagar near Dand Karwa village on 05-06-5-2010 (from 1.00 hrs till 24.00 hrs). Total numbers of vehicles were found as 2259 including cycles.

### **3.7 Ecology**

The revenue forest areas in the core zone consist of *Chhote Jhad ka Jungle*. The area comes under broad category of sub-humid to dry deciduous, mixed and sal forests. Village outskirts are identifiable from a distance due to presence of large Mahua (*Madhuca latifolia*) and mango (*Mangifera indica*) groves trees in abundance. The forest mainly consists of Sal, Mahua, Palas, Dhowda, Tendu etc. trees. Timber, Tendu leaves, gum, Mahua flowers and fruits (Gulli) etc. are obtained from the forest. Rice is the major crop raised in the area as kharif crop during the rainy season.

The Schedule-I animals found in the study area are Pangolin, Elephant, Peafowl, Sloth Bear and monitor lizard. The other animal found are twenty species of mammals, fifty one of birds, eight of reptiles, six of amphibia, eighteen of fish and twenty eight of spiders, insects and butterflies

### **3.8 Socio-economic condition**

The average density of population in the buffer zone is of the order of 107/km<sup>2</sup> as per Census 2001. The average family size is 4.91 persons/family. There are about 1045 females per 1000 male population. Total population in the study area is 47770 that include 23461 females and 24309 males. SC percentage is 5.01 while ST constitutes bulk of population (61.96%). The average literacy is 43.46%.

The literacy among women is still poorer at 15.95%. 31.87 % of the total population are main workers, while 25.81 % are marginal workers and 42.62 % are non workers.

### 3.9 Places of archaeological/historical/tourist/religious importance

There is no important archaeological/historical place or other place of tourist or religious importance within the study area.

## 4.0 ENVIRONMENTAL IMPACT ASSESSMENT AND MITIGATION

### 4.1 Climate

The climatic conditions including temperature variation, wind direction and speed, rainfall and humidity are governed by regional factors and the monsoon. As such the mining and allied activities will not tend to influence the climate.

### 4.2 Air environment

**Impact :** Source of PM10 and PM 2.5 in open cast mine is due to excavation, transportation, handling, drilling, blasting, loading and hauling operations. There are limited stationery sources of air emission in a mine and hence air pollution from the operation of these stationery sources is not anticipated. The incremental PM10 and PM 2.5 concentration outside the ML area will be maximum  $54.68\mu\text{g}/\text{m}^3$  and  $30.07\mu\text{g}/\text{m}^3$  respectively. There is very sparse habitation in the study area and hence the impact on the ambient air quality will be marginal as the forests will act as an air purifier.

**Mitigation:** Drilling and blasting will generate dust which will be controlled through excessive sprinkling. Coal handling transfer points in the coal handling plant will be provided with proper dust suppression system like water sprinklers, etc. Plantation all around the coal handling plant (CHP) will be done. In the case of haul roads dust suppression system (like water spraying) would be adopted at roads, which shall be used for transportation. Installation of water sprinklers (Whirling) has been proposed along the roads to suppress the dust and in the case of dump area the dust will be controlled through time to time sprinkling and plantation.

### 4.3 Water environment

**Impact:** Neither coal nor the OB, contains any harmful ingredients. The present annual ground water resource of the study area has been estimated is 26.77 MCM and utilization is 4.98 MCM. The balance ground water is 21.78 MCM. Thus enough balance is available for future use and the groundwater dependant activities can have low impact on long term decline of water table.

**Mitigation:** To prevent surface and ground water contamination by oil/grease leak proof containers for storage and transportation will be used. The sewage waste generated will be drained by underground impervious drains, and will be treated in Sewage Treatment Plant. Any areas with loose debris within the leasehold will be planted. Garland drains will be



constructed around freshly excavated and dumped areas so that flow of water with loose material is prevented.

#### 4.4 Noise, traffic density and ground vibration

**Impact:** Ambient noise levels in the core area are likely to increase from deployment of additional noise generating equipment like Heavy Earth Moving Machines, drills, heavy blasting and crushing operations. The main noise generating sources during coal mining are due to dozers, loaders and dumper movement, service vans, crushing, blasting operation and truck movement. Intermittent noise is generated due to operation of diesel generator. The increase in traffic will also result in increased emissions which will cause impact on the ambient air quality. The blasting operation may generate ground vibration, after commencing the mining operations.

**Mitigation:** Air Silencers will be used to modulate the noise generated by the machines. Workers will be reduced to higher levels of noise exposure by rotation. Proper maintenance of noise generating machinery including transportation vehicles will be done and blasting will be carried out in the daytime and controlled blasting shall be implemented. To control traffic coal will be transported in completely covered trucks & transport these shall be maintained leak and spillage proof. To control ground vibration appropriate blasting pattern shall be selected.

#### 4.5 Topography, drainage and land use

**Impact:** The total mine lease area is 810 Ha. Out of which, 528.48 Ha i.e. 65.24 % of land will be disturbed at conceptual stage. So 34.76 % land will remain undisturbed. The disturbed area within ML will comprise excavated land, external dumps, area occupied by infrastructure, roads etc. Another activity affecting the topography will be construction of various buildings and infrastructures. During 1<sup>st</sup> year of mining, 40 m excavation depth will be achieved. Hence, the ground water table will be intersected even during the 1<sup>st</sup> year of mining. The water will accumulate through precipitation as well as mine seepage in the mine sump. Presently, the core zone is virgin and plain terrain sloping towards south- west. The mining operations are not anticipated to cause any adverse impact on topography outside the core zone. Within core zone about 240 m deep void will be formed. The total mine lease area is 810 Ha. Out of which, 528.48 Ha i.e. 65.24 % of land will be disturbed at conceptual stage. So 34.76 % land will remain undisturbed.

**Mitigation:** Adequate measures to protect the mine workings from surface water flow during the rains will be taken by way of providing garland drains around the mine excavation, surface dumps and also providing suitable drainage gradients for mine benches. The creation of the water body will help recharge the ground water and serve as a source of water for nearby areas. The post mining land use of core zone shows that all the disturbed areas will be reclaimed before abandoning the mine excluding the void. Whole of the excavated area is proposed to be developed into a picnic spot due to the formation of water body created as a result of the left out void.

The water body will be used for irrigation, watering the forest at earlier stages and it will also attract avifauna.

#### 4.6 Solid waste management

**Impact:** Four types of solid wastes are likely to be generated through mining activities which can be categorized as over burden (Top soil & waste), sludge from oil / water separator, sludge from mine water settling pond, domestic waste.

**Mitigation:** The over burden will be initially dumped out side the mine area within the lease hold area during initial stage and the backfilling will be ensured in mined out area at appropriate time in phases at an early stage. The solid waste, which is biodegradable in nature, will be composted by conventional or non-conventional techniques (vermi-composting) into manure for use in greenbelt and reclamation. The recyclable waste will be sold to by vendors while the disposable waste will be land filled. The sludge other than oil and grease obtained from the workshop water treatment system will be disposed in an impermeable pit.

#### 4.7 Ecology

**Impact:** Impacts of different activities like noise, vibrations, lighting will result in moving away of fauna and destruction of the flora within the mine lease area. Besides, dereservation of forestland, 89.166 ha of agricultural land is anticipated to be impacted within lease area.

**Mitigation:** A thick plantation is proposed to be provided and maintained around the mining area and along the roads. During peak requirements, additional plants will be transported from Govt./Forest nurseries, located around the area. The common species used for plantation in the region are Sal, Mahua, Gulmohar, Neem, Siris, Acacia, Casuarina, Mango, China rose, Kaner.

#### 4.8 Socio-economics

The total number of displaced person in 5 affected villages including homestead oustees and land oustees is 1013. The land oustees will be given rehabilitation and resettlement benefits according to the Govt. of Chhattisgarh Policies and prevailing practice in industries in the vicinity. Preference will be given to the local people for gainful employment in the unskilled and semi-skilled categories. With the advent of the mine, infrastructure such as road, telephone, etc. will become available to the local people.

#### 4.9 Occupational Health

Medical facilities will be provided for all the employees of the mine. All the employees and contractual workers will be sent for regular health check up for the occupational diseases like silicosis, pneumoconiosis, etc., which are

typically associated with mining industry and tests like optometric, audiometric, cardio-vascular etc will be done.

## **5.0 ANALYSIS OF ALTERNATIVES**

No alternative site is proposed as coal occurrence is site specific. Sondiha Coal Block has been allotted to M/s Chhattisgarh Mineral Development Corporation Limited. Thus, the mine is being established where the mineral is available. Mining will be done through opencast as well as underground mining method under economic viability keeping in view the conservation of minerals. Mechanized mining will be followed with shovel dumper combination as the dip conditions of the block is gentle.

## **6.0 ENVIRONMENTAL CONTROL AND MONITORING ORGANISATION**

A team has been proposed to take care of pollution monitoring aspects and implementation of control measures headed by an Environmental Engineer. A schedule has been spelt out for periodical monitoring of the important environmental parameters. The total investment on environmental improvement works is envisaged as Rs. 473.35 lakhs while the recurring expenditure during the stage of production is envisaged as Rs. 128.41 lakhs per year. Total investment in the project is Rs. 575 crores approximately.

## **7.0 DISASTER MANAGEMENT PLAN**

Mining and allied activities are associated with several potential hazards to both the employees and the public at large. A worker in a mine should be able to work under conditions, which are adequately safe and healthy. In case a disaster takes place despite preventive actions, for any disaster, management will have to be done. There are various factors, which can result in a disaster in the mine. These hazards are pit slope failure, overburden dump slope failure, heavy machinery.

To avoid very high dumps, early backfilling is planned. In order to prevent the danger of overburden sliding a sturdy stonewall should be built around the toe of each active dump at a distance of about 50 m from the toe. To prevent accidents due to trucks and dumpers all transportation within the main working should be carried out directly under the supervision and control of the management. In order to prevent disaster due to surface fire/Coal stack fires sufficient fire extinguishers will be installed at selected locations on surface like electrical sub-stations, work shop, garage, diesel depot, stores, etc. Besides, sufficient number of water hydrants with sufficient hose pipes will be made available on the surface for fire protection. In the case of flooding water courses shall be diverted to other water courses, diversion of dams/bunding arrangement shall be made as part of water course diversions to prevent water entering the mining area, garland drains shall be provided around the mine pit at surface to divert surface water from flowing inside the pit. Various inlet, outlet and erosion protection structures shall also be provided.

## **8.0 PROJECT BENEFITS**

The mining project is located in one of the most undeveloped and backward area. During operation phase, around 1385 persons (468 for Opencast and General and 927 for Underground) will be directly employed at the mine. Many more persons will be indirectly engaged either on contract basis or in transportation of materials in provision of different services associated with the project. Better education facilities, proper health care, road infrastructure and drinking water facilities are basic social amenities for better living standard of any human being.

## **9.0 PROJECT CONSULTANTS**

The consultants engaged for the preparation of the EIA/EMP of the project are Min Mec Consultancy Pvt. Ltd. Company was registered in July 1983 with the Registrar of Companies, Delhi & Haryana, India. In 1994, Min Mec established a modern R & D laboratory on 02.02.2003, Min Mec received ISO 9001:2000 certification under ANZ-JAS. In June, 2006, the laboratory received accreditation from NABL. Min Mec has also applied for accreditation for EIA Consultant with the Quality Council of India and is at 142 serial numbers in the list of Consultants.