

Rapid Environment Impact Assessment  
of  
proposed project  
of

## **Jayem Coal Benefication & Power Pvt. Ltd.**

Vill. Khedapali, Tahsil Kharsia, Dist. Raigarh



By

**The Care**

33, GURUKUL COMPLEX, NEAR KALIBADI, RAIPUR  
PHONE : +91 771 4093388, FAX : +91 771 4066141

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## Preface

Jayem Coal Benefication & Power Pvt. Ltd. is new project coming up at village Khedapali, Tehsil Kharsia, Dist raigarh in Chhatisgarh state.

The company has assigned THE CARE, RAIPUR to monitor, collect and analyse various environmental parameters of the reason. So that after considering proposed project at the site, necessary Rapid Environmental Impact Assessment would be reported.

The monitoring and data collection has been done out in month of October 2008 to January 2009. The finding and predictions based on collected data has been computed and presented in this report.

We would like to express our deepest sense of gratitude to Shri Amar Agrawal, director & Shri Yogesh Jindal (CEO) of the company and his very cooperative staff members.

April 2009

(Anurag Shrivastava)

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## Chapter One

# Introduction

# Chapter 1

## Introduction

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### INTRODUCTION

#### 1.0 INTRODUCTION

One of the most important of world concern demanding international communication and cooperation is that of environment. More and more people are becoming aware of the urgent need to understand the effects of man actions in and on his environment and to control these actions, so as to preserve the ecological relationships necessary for his present and future survival. The problem of environment and conservation of natural resources have always occupied a special place among the scientific programs of UNESCO.

Implementation of preventive as well as reactive measures requires inter-policy coordination between sectors like industry, agriculture, energy, mining and other have a part in regulation the material cycles and corresponding technological systems. This applies to the fiscal sector because pricing policies and the range of financial incentives often play a decisive role in preventing or causing environmental damage.

The policy-makers faced with long-term environmental problems often argue that they cannot afford to worry about the remote and the abstract when surrounded by the immediate and the concrete. The progress of any country depends upon its industry. The more industrialized the country is, the more developed it is.

The industry is a boon at one hand a curse in another. Boon because we get all comforts of life and curse because the atmosphere gets polluted. The pollution may be in air, water or land. One way is not to have any chemical industry. That means we have to go to the stone stage which is not possible. The other alternative is to fight back this effect. The third alternative is to get the useful products from the waste if possible.

The judicious of industry with clean technology will not only add to environmental conservation but will also have long term impact on the economy both directly and indirectly.

The atmosphere, which makes up the largest fraction of the biosphere, is a dynamic system that continuously absorbs a wide range of solids,

liquids & gases from both natural and man-made sources. These substances travel through air, disperse and react with one another and with other substances both physically & chemically.

Air pollution is basically the presence of foreign substance in the air. Water pollution could be defined in the same manner.

Environmental Impact analysis is the basic tool for maintaining balance between ecology and economy. Site - dependent and Site independent impact needs to be analysed on the basis of background data and information about the site while the analysis of site independent impacts is basically the scrutiny of technological option.

Utilisation of the abundant biomass energy resources available in our country is being accorded high priority by the Ministry of Non-Conventional Energy Sources followed by use of coal reject and coal to balance generation of steam. Development of cost-effective and reliable technologies as well as development of field projects for tapping these resources therefore, assume special significance.

## 1.2 ABOUT THE PROMOTERS:

Mr. Amar Agrawal is a known personality of Raigarh area. Under his guidance one very well maintained thermal power plant is running at orrisa road Raigarh. The power plant is located about 3.0 kms from Raigarh – Saraipali road. One may judge the operating efficiency of the group and good ecological friendly atmosphere at power plant.

## 1.3 OBJECTIVE

The objective of the study is to conduct Rapid Environmental Impact Assessment for coal beneficiation of 0.96 million ton per year.

The Environmental Management Plan has been prepared to assess the current environmental scenario of the area and then based on the activities of proposed coal beneficiation, to carry out Rapid Environmental Impact Assessment. The plan will identify and address the impacts, where these are adverse in nature, design mitigative measures to manage such impacts in a manner as to conserve environment and ecology of the area. The EMP has been prepared with a view to ultimately ensure that the adverse impacts are minimized if these cannot be prevented altogether.

Environmental clearance is a statutory requirement for the establishment of any project of which EIA has to be prepared and submitted to respective agencies of state level in line with Environment Impact Assessment Notification dated 14.09.2006 of ministry of environment and forest.

#### 1.4 THE MAIN OBJECTIVES

The main objectives of this EMP are listed below:

- To establish the present environmental scenario
- To anticipate the impacts of proposed future coal beneficiation operations on the environment.
- To prepare a detailed action plan for implementation of mitigative measures.
- To suggest preventive and mitigative measures to minimise adverse impacts and to maximize beneficial impacts.
- To prepare an afforestation scheme, if required.
- To prepare a proper rehabilitation package for those affected, if any.
- To suggest a monitoring programme to evaluate the effectiveness of mitigative measures.
- To suggest the formation of a core group responsible for implementation of environmental control and protective measures and monitoring of such implementation.
- To suggest a feedback mechanism enabling to make mid course corrections.
- To prepare a capital cost estimate and an annual recurring cost for Environmental Management Plan.

#### 1.5 STUDY AREA AND STUDY PERIOD

As per the guidelines of Ministry of Environment and Forests, to collect baseline environmental status data in order to predict the impact and to formulate an environmental management plan for the proposed coal beneficiation at Khedapali, Tehsil - Kharsia Dist Raigarh, Chhatisgarh. An area lying within 10 Km peripheries around the proposed construction site was considered as study area for Rapid Environmental Impact Assessment Study.

The REIA study for proposed coal beneficiation carried out during the period of January 2009 to March 2009.

## 1.6 SCOPE OF WORK

The purpose of REIA report is to identify and evaluate the potential impacts (beneficial and adverse) of the proposed Coal beneficiation on the existing environmental systems. Thus the purpose of REIA can be summarized as the presentation of environmental consequences of the project activities, so that all factors can be considered while taking final decision to install project.

To carry out a thorough study, scope of work has been proposed as under.

Assessment of present level of pollution (Air, Water and Noise) in and around the proposed project under the existing conditions. This include Monitoring of ambient air quality for RSPM, SPM, SO<sub>2</sub>, NO<sub>x</sub>, CO in and around the proposed site at selected stations as per the guideline.

During each ambient air monitoring day, Meteorological data (Wind velocity, wind direction, air temperature, humidity and cloud cover of sky) to be collected from secondary source (from nearest IMD).

Sampling and analysis of ground water at project site and around it, as per IS standard.

Sampling and analysis of raw water source and intake point as per IS standard.

Sampling and analysis of surface water as per parameters prescribed by MoEF.

Monitoring of Noise levels around the plant site.

Testing of soil samples.

i) Collection of meteorological data from nearby observatory / IMD.

Collection of demographical data within a radius of 10 Km s of the proposed project site.

Carry out computerized dispersion model study for SPM for short term and long-term concentration.

Assessment of existing environmental status of water, air, flora, fauna, demographic and socio-economic factors, land use pattern.

Find out impact of construction activities and planning for the materials required for construction and their sources of supply.

Study of proposed pollution control equipment, fugitive dust emissions, solid waste disposal, noise pollution and environmental effect on plant operations. Study of preventive and control measures proposed for safety of work. Study of short term and long term impacts on sensitive targets such as endangered species of wildlife, plants and economically important crop, the historically important site, population of elderly / infants.

Suggest measures and recommendations for pollution control and its monitoring equipment/ system and organizational set up for maintenance of pollution control equipment.

Preparation of Rapid Environmental Impact Assessment ( REIA) report covering all items as per the Performa from Ministry of Environment and Forests, Govt. of India.

Inclusion of guidance given in the issued Terms of References.

## 1.7 METHODOLOGY

The methodology adopted for the REIA study was based on the size of the proposed plant, the guidelines for EIA set up by MoEF and the proposed impacts within 10 Kms of proposed Coal beneficiation project.

The baseline information with respect to air, water, noise and land environment was collected by conducting field studies. The period of sampling was during January 2009 to March 2009 .

### 1.7.1 Air Environment

The air environment around the site was studied by setting up Ambient Air Quality Monitoring (AAQM) station within 10 Kms radius of the site. Total 8 AAQM stations as per the guideline, were set up around the site with due consideration to the population zone, sensitive receptors of the area and local meteorological data obtained from previous records of Indian Meteorological Department. The pollutants monitored in ambient air included Suspended Particular Matter (SPM), Respirable Suspended Particular Matter (RSPM), Sulphur Dioxide (SO<sub>2</sub>), Oxide of Nitrogen (NO<sub>x</sub>) and Carbon Monoxide (CO). These pollutants were monitored on 8 hrs basis for period of 24 hrs. Monitoring of all the stacks of the existing plant was carried out for Total Particulate Matter. Besides ambient air monitoring and source sampling, Screen and ISC (Industrial Source Complex) models were run to facilitate prediction of short-term ground level concentration of pollutants from the proposed plant.

### 1.7.2 Noise Environment

Noise level studies were conducted in and around the proposed site of Jayem Coal Beneficiation and Power Pvt Limited, to collect the baseline noise information. In a Proposed Plant the major noise generating sources are expected to be:

- Rotating Equipments
- Feed Pumps
- Start up Vents
- DG Sets



- Heavy vehicle movement

The noise levels of the surrounding villages were monitored during ambient air quality monitoring days.

### 1.7.3 Water Environment

Raw water required for the operation of washery and for domestic use would be made available from Bore Well. The waste water generation sources would be Water collection and recirculation section and Sewage from the administrative buildings and washing of coal. Hence, in order to assess the Physico-Chemical quality of the raw water, numbers of water samples were collected from wells in the villages surrounding the plant. Surface water samples were collected from Nallah in East direction.

### 1.7.4 Land Environment

The land environment around the proposed site was studied by collecting soil samples from surrounding villages. Soil sampling facilitates assessing the impact due to deposition of dust. The samples collected were analysed for infiltration rate and other physico-chemical parameters.

### 1.7.5 Biological Environment

Dust coming from Coal beneficiation may have an impact on the biological environment. Hence, study of the existing cropping pattern; agricultural practices, flora and fauna of the area were carried out. As stated above soil samples were also collected from surrounding villages to assess the impact of the industry on agriculture.

### 1.7.6 Socio-Economic Environment

The socio-economic environment within 10 km radius of the proposed plant was studied by collecting data such as demographic pattern, population density, cropping pattern, employment pattern, availability of amenities like education, medical, transport, power, drinking water, etc.

Also data regarding monuments, religious and tourist places of interest were also covered under this class. Socio-economic impacts can be predicted and assessed based on changes in the existing pattern.

## 1.8 ADMINISTRATIVE AND LEGISLATIVE BACKGROUND

The principal Environmental Regulatory Agency in India is the Ministry of Environment and Forests (MoEF), New Delhi; MoEF formulates

environmental policies and accords environmental clearance from the projects.

Many State and Central legislation have a bearing on environment but laws on "environment protection" have been notified recently. These laws can be broadly classified in term of focus areas viz.

Pollution;

Natural resources; and

Linkage between pollution and natural resources.

The status of key environmental legislation in India is given below :

The Environment (Protection) Act, 1986 and Environment (Protection) Rules (1989) issued there under;

Environment Guidelines for sitting of Industries, 1985 and Environmental Impact Assessment (EIA) of development projects; Background Note, February 1989, MoEF;

- Air (Prevention and Control of Pollution) Act, 1981, as amended in 1987;

- Water (Prevention and Control of Pollution) Act, 1974 as amended in 1978 and 1988;

- Water (Prevention and Control of Pollution) Cess Act, 1977 as amended in 1991;

- Public Liability Insurance Act, 1991;

- Forest (Conservation) Act, 1980 and the Rules framed there under;

The Forest (Conservation) Rules, 1981, later Amendment, Notifications and Guidelines issued there under.

- Indian Factories Act, 1948 (As amended by Act 20 of 1987) and Hazardous Waste Management and Handling Rule; 1989, as amended 2000

Battery (Management and Handling) Rule, 2001

- Manufacture, Storage and Import of Hazardous Chemicals, Rules, 1989, MoEF.

The MoEF is the nodal agency to set policy and standards for the protection of environment along with Central Pollution Control Board (CPCB). This includes air, noise, water and hazardous waste standards. The relevant standards, which are of significance to the proposed project, are given in annexure.

#### 1.9 The EIA notification September 2006

As per the Notification of the MoEF dated 14.09.2006, any new project and/ or expansion/ modernization of any activity shall not be undertaken in any part of India unless it is accorded Environmental

Clearance by the central government in accordance with the procedures specified in this Notification. As per the procedure, any body that desires to undertake any project in any part of India or expansion or modernization of any existing industry needs to be submitted the details in Form 1 and accordingly the State Level Environment Impact Assessment Authority (SEIAA) shall take decision regarding the status of the project. Accordingly, this EIA report has been prepared for the perusal of statutory bodies (State Pollution Control Board and Ministry of Environment and Forest) to judge the environmental viability of the project.

Requirements of prior Environmental Clearance (EC): - The projects or activities shall require prior environmental clearance from the concerned regulatory authority, for matters falling under Category 'A' in the Schedule and at State level the State Environment Impact Assessment Authority (SEIAA) for matters falling under Category 'B' in the said Schedule, before any construction work, or preparation of land by the project management except for securing the land, is started on the project or activity:

All new projects or activities listed in the Schedule to this notification;

(ii) Expansion and modernization of existing projects or activities listed in the Schedule to this notification with addition of capacity beyond the limits specified for the concerned sector, that is, projects or activities which cross the threshold limits given in the Schedule, after expansion or modernization;

(iii) Any change in product - mix in an existing manufacturing unit included in Schedule beyond the specified range.

Categorization of projects and activities: -

(i) All projects and activities are broadly categorized into two categories - Category A and Category B, based on the spatial extent of potential impacts and potential impacts on human health and natural and man made resources.

(ii) All projects or activities included as Category 'A' in the Schedule, including expansion and modernization of existing projects or activities and change in product mix, shall require prior environmental clearance from the Central Government in the Ministry of Environment and Forests (MoEF) on the recommendations of an Expert Appraisal Committee (EAC) to be constituted by the Central Government for the purposes of this notification; in case of Power Project, if the project is proposed for producing more than 5 MW of power but less than the 50 MW of power from the fuel other than coal /lignite/naphtha and gas, the project will be termed as category "B" project.

(iii) All projects or activities included as Category 'B' in the Schedule, including expansion and modernization of existing projects or activities or change in product mix but excluding those which fulfill the General Conditions (GC) stipulated in the Schedule, will require prior environmental clearance from the State/Union territory Environment Impact Assessment Authority (SEIAA). The SEIAA shall base its decision on the recommendations of a State or Union territory level Expert Appraisal Committee (SEAC) as to be constituted for in this notification.

## Chapter Two

# Project Scenario

# Chapter 2

# Project Scenario

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## 2.1 INTRODUCTION

In the past century it has been that the consumption of non-renewable source of energy has caused more environmental damage than by other human activity. But it's not true, generation of power from coal rejects is the possible source of brightness in the bleak scenario or our power sector and hence development and commercialisation of cost effective technologies for the full exploitation of such energy sources is of utmost importance. Coal rejects has been used as a fuel since time immemorial. However with rapid increase in fossil fuel use, share of coal rejects in total energy has declined steadily during this century. Yet it still constitutes 14% of the world energy and 38% of the energy consumed in developing countries, predominantly in the rural and traditional sectors of the economy.

Now a days quality of coal available and coal available reserve shown path to increase the quality of coal by it's beneficiation. And giving coal rejects as solid waste left to be utilise in power plant. The methodology is based on determination of the project components i.e. collection of basic data on the project under consideration, type of project, need for project, size or magnitude of operation, technology and process description and assessment of the technology. It is a condensed description of those aspects of the project likely to cause environmental effects.

Most of the project data are for construction, process and operation related data. Project data are distinguished into project description, resources requirement (water, power, etc.), technology and raw materials used, implementation period, land required, emission abatement and resource recovery (water, solid waste, energy, etc.)

## **2.2 TYPE AND NEED FOR THE PROJECT**

Power is the most important factor that influences economic development of the nation. That to it's generation from waste would be most beneficial. India continues to be a power-starved nation even after 50 years of planning and the experience of putting up generating capacity with associated transmission and distribution systems. There has been a deficit power situation in the country as well as in the State of Chhattisgarh which was earlier a part of Madhya Pradesh State. With depleting fresh fossil fuels, the renewable source of energy has gained importance worldwide. The Government has been encouraging setting up of mini power plants based on the usage of renewable sources. Keeping in view the deficit situation for power and encouragement given by Government for setting up of coal rejects generation and obtain healthy quality of coal to be utilized by sponge iron plants, M/s Jayem Coal Beneficiation and Power Pvt. Limited would be establishing a 0.96 Million Tons per annum coal beneficiation project in vill. Khedapali Tehsil Kharsia , Dist Raigarh. The project is proposed to be located near Chhal colliery of Raigarh district in Chhattisgarh State.

### **2.2.1 Demand of Washed Coal**

Since a lot of sponge iron plant has already established and some more executing expansion too. The need of wash coal is increasing day

by day. It is well know fact that utilization of washed coal for production of sponge iron give better product and less process loss. So potential of coal beneficiation is increasing day by day.

### **2.2.2 State Scenario**

It may be observed from the above the total energy requirement increases from 6724.08 MU (actual during 2000 -01) to 7748.64 MU during 2001-02 (the base year). This figure increases to 12833.47 MU by 2010-11 representing a CAGR of 5.77%. The above translates to a demand at peak load of 5360.84 MW in 2001 -02 going up to 2123.20 MW in 2010-11. Based on this projected energy requirements, Chhattisgarh is expected to have a peak shortage of approximately 185 MW during the current financial year, which is expected to increase to 918 MW by 2010-11 in case there is no increase in installed capacity.

One should think of utilization of waste in to energy and better quality product. The only coal beneficiation is process available which convert rotten fossil fuel into better fuel yield with economic growth from waste utilisation.

About ten years back none of the sponge iron plant were using washed coal because of ash/stone content of coal as well as it's size were up to the mark of processing standard. But now a days quality of coal has decreased very much. A part from quality availability of good coal has reduced to very high extend. Thus such type of problems has forced the market to install coal beneficiation plants.

### **2.2.3 Significance of This Energy**

It is in the above background, the coal rejects sources of energy have attracted global attention and evoked interest among planners, policy



makers, economists and environmental activists as a viable option to achieve the goal of sustainable development. If the current interest in coal rejects source of energy gets concretized into projects to tap their enormous potential, the energy generation in 21st century can be expected to move away from fossil fuels only.

Power generation from coal rejects resources has steadily increased. Considering that the potential of coal rejects energy is estimated at 100000 MW and the utilisation thereof so far is only marginal, it is said that, Ministry is targeting creation of a total capacity of 12000 MW through coal rejects sources by the year 2012.

### 2.3 SILENT FEATURES OF THE PROJECT

|                            |                                                                                                      |
|----------------------------|------------------------------------------------------------------------------------------------------|
| Site Address               | Khasra no 222, 223, 226, 227 Ph no 30,<br>Village- Khedapali, Tehsil Kharsia,<br>Dist Raigarh (C.G.) |
| Coal Benefication Capacity | 0.96 Million Tons per Annum                                                                          |

#### OPERATING PARMETERS

The operating parameters of the plant are as under :-

- 1) Type of Washing Plant : Barrel only washing plant.
- 2) Number of products : 1) Washed Coal  
2) Coal Rejects
- 3) Throughput capacity : 9.6 lakh TPA
- 4) Raw coal feed : 45-50% ash
- 5) Ash in Clean Coal : (-) 34 for power & (-) 28 for  
Sponge & Cement.
- 6) Operating Hours : 7000 hours/year

## **Main Plant, Machinery & Equipments**

The choice of various equipments are guided by the prime technological characteristics to meet the specific requirement of raw -materials, choice of process, simplifications. Since the technology selected for the project is already a proven one, a number of reputed suppliers are in the field from whom the reliable plant and equipments will be procured. The same suppliers will also stand a performance guarantee, wherever necessary, for the plant Operation, product specification assurance and fulfillment of rated capacity.

Suppliers/consultants have been chosen on the basis of Cost analysis, delivery period and reliability. Besides all the production equipments, other equipments like laboratory instruments, workshop equipments, power supply systems etc. have been included. The capacity of the equipment has been decided on the basis of experience of similar units. Reasonable allowance has been made for future expansion. Sufficient inbuilt cushion has been made for the fact that every equipment does work up to its rated capacity.

The main equipments are: -

1. Vibro Feeder
2. Vibrating Screen
3. Barrel washer
4. Crusher
5. Wedge Wire Panel
6. Pumps

## 7. Conveyors

### Plant & Machinery

#### *Brief Description of Machines for Coal Washery Plant*

|   |                                                   | Nos. |
|---|---------------------------------------------------|------|
| 1 | Weigh Feeder                                      | 1    |
|   | Cap - 500 TPD<br>BW - 1200 mm x 4.5Mtr.Long       |      |
| 2 | Vibrating Screen                                  | 1    |
|   | Size : 2'x8'x14' – DD                             |      |
| 3 | Vibrating Screen                                  | 1    |
|   | Size : 2'x7'x14' – TD                             |      |
| 4 | Dewateriser                                       | 4    |
|   | Size: 68'x20', 2.5 Deg.UpHill                     |      |
| 5 | Double Roll Coal Crusher,                         | 1    |
|   | Cap - 500 TPH                                     |      |
| 6 | Classifier                                        | 3    |
|   | 150 TPH each                                      |      |
| 7 | Wedge Wire Panels                                 |      |
|   | For 8-20 mm                                       | 1    |
|   | For 20-30 mm                                      | 1    |
|   | For 30--40 mm                                     | 1    |
|   | For Reject                                        | 1    |
| 8 | Pump - (From Slurry Tank to<br>Lagoon) 1250m3/Hr. | 2    |

|    |                                                                                                       |   |
|----|-------------------------------------------------------------------------------------------------------|---|
| 9  | Pump -(From Lagoon to Water Tank) 100 m3/Hr.                                                          | 2 |
| 10 | Compressors<br>7 Kg. 100 CFM                                                                          | 1 |
| 11 | Belt Conveyor (BC-1)<br>BW - 1200MM X 65 Mtrs.                                                        | 1 |
| 12 | Belt Conveyor (BC-2)<br>BW - 1200 mm x 91 Mtrs.                                                       | 1 |
| 13 | Belt Conveyor (BC-3)<br>BW - 600 mm x 20 Mtrs.<br>For Carrying Coal 0-8 or 8-20<br>or 0-20 mm         | 1 |
| 14 | Belt Conveyor (BC-4)<br>BW - 600 mm x 20 Mtrs.<br>For Carrying Washed Coal<br>8 - 20 mm               | 1 |
| 15 | Belt Conveyor (BC-5)<br>BW - 800 mm x 20 Mtrs.<br>For Carrying Washed Coal<br>20-40 or 0-8 & 20-40 mm | 1 |
| 16 | Belt Conveyor (BC-6)<br>BW - 600 mm x 20 Mtrs.<br>For Carrying Rejects.                               | 1 |
| 17 | Water System Piping Valves<br>Pump sets etc.                                                          | 1 |
| 18 | Weighbridge                                                                                           | 1 |

- The water requirement of the plant will be 125 cum/day. which will be made by Bore well sources, and water is available throughout the year. The water requirement will also be supplemented with the water from the bore wells if needed
- The promoters have already purchased a land of 8.23 acres.
- The Project cost for the proposed Coal beneficiation out to Rs. 600.00 lakhs.

#### PROJECT DESCRIPTION & MANUFACTURING PROCESS OPERATIONAL ACTIVITIES FOR PROPOSED COAL BENEFICIATION PLANT

Coal Benefication is the process for cleaning & reducing ash content in the coal, thus improving the quality of coal.

##### Coal Benefication

In India, coal is the cheapest source of Thermal Energy, which is found in abundance. But it's quality is very poor compare to the coal being imported from China & Australia. Also there is a wide variations in the quality of coal from mines to mines. In some cases the ash contents are as high as 45-50% also.

Due to the scarcity of required quality of coal in the country many consumers are forced to import coal. Substantial amount of foreign exchange is going out which can be stopped if clean coal is produced in the country.

The ash in the coal is contributed mostly by the presence of shales, stones and clay in it, which can be removed by various method's (WET

Coal Washeries and Dry Deshaling Plant). The process of separation to be adopted depends on the type of ash contribution factors.

#### 2.4.2 Selection of Technology

From a literature survey on updated technologies available for coal preparation together with operating data from various coal washeries in the country and overseas, the following points are amply borne out

- 1) Indian coals having substantially high "near gravity material" require a very sharp separation to recover clean coal from the associated high ash rejects.
- 2) In view of intertwined coal, shale & sandstone belonging to "drift origin" of coalification, the separation also results in a good degree of misplacement i.e. migration of clean coal to rejects & vice versa known as 'error area' in the usual coal preparation parlance.
- 3) Even some of the improved jigs have not been able to deliver desired results. The "Imperfection" of the vessel has been reported to be considerably high.
- 4) Dense media static baths have responded well on lumpy coal with attendant problems of media recovery.
- 5) Dense media cyclone process on fine coal has proved quite efficient with some inherent limitations on the capacity of its rejection through underflow nozzles. While the efficacy of the process has not been questioned by the operators, it has been rather cost prohibitive. These costs are primarily associated with media preparation and its recovery through depulping rinsing screens, a number of tanks and pumps to deal with dense media, correct density media and dilute media coupled with the bank of wet magnetic Separators. At times,

classifying cyclones and thickeners also show up in the magnetite preparation circuit.

In view of the above, our efforts have been to scout for a cost effective technology which is similar in process to static bath and dense media cyclone but devoid of the burden of media recovery. It has been possible for us to locate an in-house development presumably a suspension of magnetite ultra fines in some chemical solution under the influence of magnetic flux provide the desired apparent density of separation without permitting the media to stick to coal particles. Since media does not stick to coal, the consumption of media is negligible, attributable only to incidental losses in the circuit.

Additionally, as the media in the vessel is not in turbulent state, the generation of fines while procession in the vessel would be much less as compared to the dense media cyclones where a vigorous tangential stream operates at the entry point and subsequent cyclonic action inside the equipment. This feature entails handling of low quantity of coal slimes, reducing the capital and operating expenses of the plant.

#### 2.4.3 Fluidized Bed Classifier

The "Fluidized Bed Classifier", as the vessel had been named, has attracted our attention. Compounded with the satisfactory reports from the users of washed coal of this technology through a few operating installations and more in the offing, the technology is proven and likely to open wide horizons on its adaptability for large scale operations.

To sum up, taking into consideration the following aspects, we decided to opt for this technology for the proposed washery : -

Simplicity of operation

Process economics related to recovery & consumption of media &

Less handling of process slimes.

#### 2.4.4 Process Description

Raw Coal of (-) 200 mm size received at the plant to be fed to two 20 Ton capacity Ground Hopper at a regular rate. Through Vibro Feeders and a Conveyor the coal will be fed to a Single Deck Vibrating Screen. The overflow of the Screen will be directly fed onto a Roll Crusher for crushing down to (-) 50 mm sizes and the underflow of the screen (-) 50 mm shall join the crushed product of the crusher on the conveyor on another conveyor, which will be discharged into a 200 Ton capacity Surge Bunker. A Belt Conveyor shall reclaim the materials through a Vibro Feeder and feed the Barrel at the rated capacity.

The feed coal along with the media will pass down the Launder to the Rotating Barrel Washer. The sinks or rejects will move up the Barrel and discharge on a dewatering Screen for dewatering and conveying through a Belt Conveyor discharged into a Bunker for further reclamation.

The floats of the Barrel will travel with the media towards the other end of the Barrel, pass through a Straight Sieve attached to it for dewatering and (-) 1 mm fraction and (+) 1 mm discharged on a Vibrating Screen for further dewatering from where it will be directly conveyed by a conveyor to the storage bunker for reclamation.



Effluent generated in the Washing Plant in the form of Coal Slurry, which is a mixture of water and coal fines of ( -) 0.5 mm size, shall be collected in a Thickener / Clarifier Cell. Flocculants for quick settlement of solids, shall be mixed with water as required.

Solids which substantially gets settled in the Clarifier Cell, is pumped into the Solids Buffer Tank and from there, it is fed into the Filter Press for filtration. The Press filters the material and produces solid filter cakes.

The overflow of the Clarifier Cell is more or less clear water and will be pumped back to the Washing Plant as also to Clarifier Cell, if required. Clean water Manifold receives water from the clean water tank, from where it is distributed at various points and also added over the Belt Press cloth, and the Agitated Holding Tank.

The make up water for the plant shall be pumped in by a Water Pump located near the fresh water tank, and discharged into the slurry tanks, as required to maintain specific gravity of the media.

There will be 3 (three) streams, each of 50 TPH throughput capacity, to work in tandem or independently. Thus, there will be ample freedom in operation, depending on the flow of raw coal and / or demand.

Raw Coal received from the mines on dump hoppers shall be pre-screened through grizzly feeders, fed on to conveyors, crushed and partly deshaled manually. After crushing, the coal will be screened in different size fractions like -8mm, 8-20mm, 20-30mm and 30-40mm

to be stock piled separately through belt conveyors to feed various washing streams. The crushed will be fed into Fluidised Bed Classifiers of various capacities as dictated by the size range of feed coal & process requirement. The clean coal and rejects separately will be dewatered on combination of sieve bends & vibrating screens. The dewatered clean coal will be stocked on ground & various sizes are proportioned to meet the ash requirement of users before dispatch. Initially such dispatches have been planned through trucks. The rejects are also stocked & dispatched to consumers depending upon the demand based on their ash contents.

The wet slimes (-0.5 mm) arising from the operations are stored in slurry ponds from where water is recycled back to the process circuit ensuring "zero effluent" from the plant premises.

The make -up water for the plant is made available by a water pump located near the fresh water tank.

Schematic flow sheets of material handling & coal washing plants appear respectively.

## **2.5 RESOURCE REQUIREMENT**

The present proposal is for 0.96 Million Tons coal beneficiation project. For efficient operation of the plant all necessary utilities will be made available, a brief description of the same is given below.

### **2.5.1 Storage facility**

It is proposed to provide adequate storage facilities for all the materials to be used in washery. Covered area will be used in proposed project for raw coal storage.

### 2.5.2 Electric system

Internal consumption of coal washery will be 555 kw.

### 2.5.3 Design and Guarantee Fuel

As per requirement of washed coal and rejects user, we shall be producing fuel for power plant i.e. Coal reject. The calorific value of our product will be as follows

|             |                     |
|-------------|---------------------|
| Coal reject | 1900 - 2100 Kcal/kg |
| Coal        | 3600 - 3900 Kcal/kg |

The following will be the fuel analysis :

#### a) Coal Reject

|                             |   |             |          |
|-----------------------------|---|-------------|----------|
| - ash content               | : | 55.0 %      |          |
| - quantity of ash in coal   | : | 240000      | Ton/year |
| - sulphur content           | : | 0.2 %       |          |
| - hydrogen content          | : | 4.5 %       |          |
| - Inherent moisture content | : | 9.0 %       |          |
| - volatile matter           | : | 30 %        |          |
| - fixed carbon              | : | 18 %        |          |
| - Oxygen content            | : | 13 %        |          |
| - calorific value           | : | 1900 - 2100 | Kcal/Ton |

## **b) Raw Coal**

|                             |   |        |          |
|-----------------------------|---|--------|----------|
| - quantity of raw coal      | : | 3200.0 | Ton/day  |
| - ash content               | : | 45.0   | %        |
| - sulphur content           | : | 0.25   | %        |
| - hydrogen content          | : | 4.5    | %        |
| - Inherent moisture content | : | 10.0   | %        |
| - volatile matter           | : | 30     | %        |
| - fixed carbon              | : | 28     | %        |
| - Oxygen content            | : | 12.3   | %        |
| - calorific value           | : | 3500   | Kcal/Ton |

## **2.6 Raw Water**

### **2.6.1 Water requirement**

The raw water supply for the coal beneficiation and power plant will be from the Borewell Sources. The raw water will be used as a makeup for the losses in the coal beneficiation by water jet, water sprinkler at various location to suppress dust dispersion, service water etc., The raw water will be stored in a concrete tank of capacity of 1000 m<sup>3</sup>.

## 2.6.2 Water Balance of Proposed Project

| Sr. No. | Item                        | Water Consumption (M <sup>3</sup> / Day) | Water Losses (M <sup>3</sup> / Day) | Effluent Generation (M <sup>3</sup> / Day) | Treatment and disposal                                                                                                                                           |
|---------|-----------------------------|------------------------------------------|-------------------------------------|--------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| A.      | Domestic                    | 18                                       | 05                                  | 13                                         | Treated through septic tank and soak pit, then in plantation                                                                                                     |
| B.      | Horticulture                | 10                                       | 10                                  | ---                                        | In summer only, in other season treated effluent would be used                                                                                                   |
| C.      | Dust suppression / Spraying | 12                                       | 12                                  | ---                                        | Absorption                                                                                                                                                       |
| D.      | Coal benefication           | 85                                       | 08                                  | 77                                         | 77 M <sup>3</sup> /day would estimated generation of effluent. Which would be recycled back into process for washing coal again. So it would not be waste water. |
|         | Total                       | 125                                      | 35                                  | 90                                         |                                                                                                                                                                  |

From the above-mentioned table it is cleared that there is no effluent generation from the operational as well as domestic activities. Hence the "Zero Discharge" condition will be maintained all the time throughout year.

## 2.7 Fire Fighting System

It is proposed to plan out a system to meet the requirement for fire fighting as per norms of health and safety . We will install fire fighting system of all the categories.

## 2.8 Transport

The proposed plant site is easily accessible by road . The site is located about 18 Km away from Kharsia block in raigarh Dist. Nearest railway

station is Kharsia on the Mumbai - Howra broad gauge line of South-Eastern-Central Railway.

## 2.9 Land Requirement

The promoters have already purchased a land of 8.23 acres. The acquired land is barren land having some low -lying area.

The total area of the proposed project 8.23 acres.  
Other details are given below :

|      |                            |       |       |
|------|----------------------------|-------|-------|
| i    | Total area                 | 8.23  | Acres |
| ii   | ADM Building               | 270   | sq m  |
| iii  | Processing shed            | 2290  | sq m  |
| iv   | Raw material storage       | 5700  | sq m  |
| v    | Ash handing system         | 150   | sq m  |
| vi   | Coal reject storage        | 400   | sq m  |
| vii  | Washed coal area           | 190   | sq m  |
| viii | Water storage tank         | 1000  | sq m  |
| ix   | Clarifier                  | 065   | sq m  |
| ix   | Road area                  | 1850  | sq m  |
| x    | Parking area small vehicle | 150   | sq m  |
| xi   | Parking area heavy vehicle | 650   | sq m  |
| xii  | Chimney base               | 12    | sq m  |
| xiii | Time office                | 20    | sq m  |
| xiv  | Plantation                 | 35000 | sq m  |

## 2.10 Implementation Period

The proposed projects expected to start operation after 08 months from environment clearance.

## 2.11 Plant Layout

The Index map and site plan of the proposed units is shown in **Figure 2.2 and 2.3.**

# COAL BENEFICIATION PROCESS FLOW SHEET DIAGRAM

- RAW COAL
  - FROM GR. HOPPER FEED TO
  - DOUBLE DECKER CRUSHER
  - SCREENED IN VIBRATORY SCREEN
    - COAL OF REQD SIZE
    - WASHED IN BARREL WASHER
    - CLEAN COAL STORE IN YARD
  - DISPATCH IN DIFFERENT SECTION



**CONVEYOR & ROPEWAY SERVICES PVT. LTD.**  
 75-C, PARK STREET, 6TH FLOOR,  
 KOLKATA- 700 016

CLIENT:- JAYEM COAL BENEFICATION AND POWER (PVT.) LIMITED

DRAWN TDG

PROJECT:- MODULER COAL WASHERY

CHECKED-A

TITLE:- FLOW DIAGRAM OF BARREL WASHERY

SCALE:- N.T.S

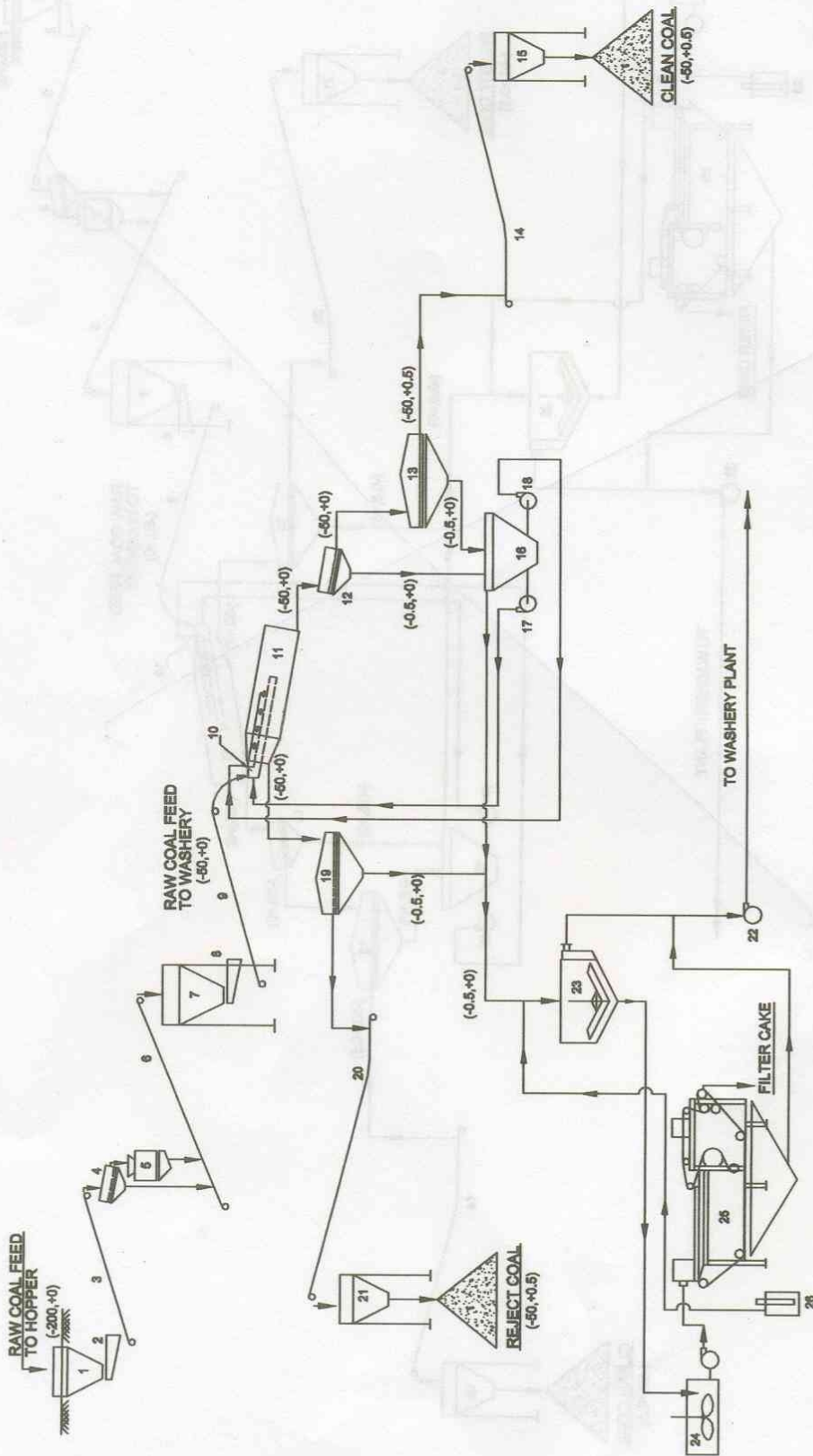
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DRG. NO.- PD.298.102

FILE:- WASHERY PROPOSAL

SHEET 1 OFF 1

APPROVED



| UNIT NO. | DESCRIPTION                         | QTY. |
|----------|-------------------------------------|------|
| 16       | FEED TANK                           | 1    |
| 17       | LAUNDER FEED PUMP - 64 SIZE         | 1    |
| 18       | BARREL FEED PUMP - 43 SIZE          | 2    |
| 19       | VIB. SCREEN FOR REJECTS.            | 1    |
| 20       | REJECT CONVEYOR (CLIENT'S SCOPE)    | 1    |
| 21       | REJECT COAL HOPPER (CLIENT'S SCOPE) | 1    |
| 22       | RECYCLED WATER PUMP                 | 1    |
| 23       | CLARIFIER                           | 1    |
| 24       | AGITATED HOLDING TANK               | 1    |
| 25       | BELT PRESS                          | 1    |
| 26       | FILTRATE PUMP                       | 1    |

| UNIT NO. | DESCRIPTION                                  | QTY. |
|----------|----------------------------------------------|------|
| 01       | RAW COAL HOPPER (CLIENT'S SCOPE)             | 2    |
| 02       | VIB. FEEDER FOR RAW COAL (CLIENT'S SCOPE)    | 2    |
| 03       | R.C. SCREEN FEED CONV. (CLIENT'S SCOPE)      | 1    |
| 04       | SINGLE DECK SCREEN (CLIENT'S SCOPE)          | 1    |
| 05       | ROLL CRUSHER (CLIENT'S SCOPE)                | 1    |
| 06       | BUNKER FEED CONV. (CLIENT'S SCOPE)           | 1    |
| 07       | BUNKER - 200 T CAP. (CLIENT'S SCOPE)         | 1    |
| 08       | VIB. FEEDER FOR BARREL FEED (CLIENT'S SCOPE) | 1    |
| 09       | WASHERY FEED CONV. (CLIENT'S SCOPE)          | 1    |
| 10       | FEED LAUNDER                                 | 1    |
| 11       | 8'x36' BARREL WASHER                         | 1    |
| 12       | STATIC SIEVE                                 | 1    |
| 13       | VIB. SCREEN FOR CLEANS                       | 1    |
| 14       | CLEAN COAL CONV. (CLIENT'S SCOPE)            | 1    |
| 15       | CLEAN COAL HOPPER (CLIENT'S SCOPE)           | 1    |

PROPOSAL DRAWING  
 DETAILS AND DIMENSIONS NOT BINDING



# JAYEM COAL BENEFICATION & POWER PVT. LTD. RAIGARH

RAW COAL STORAGE

WEIGH BRIDGE

WEIGH BRIDGE

LAB

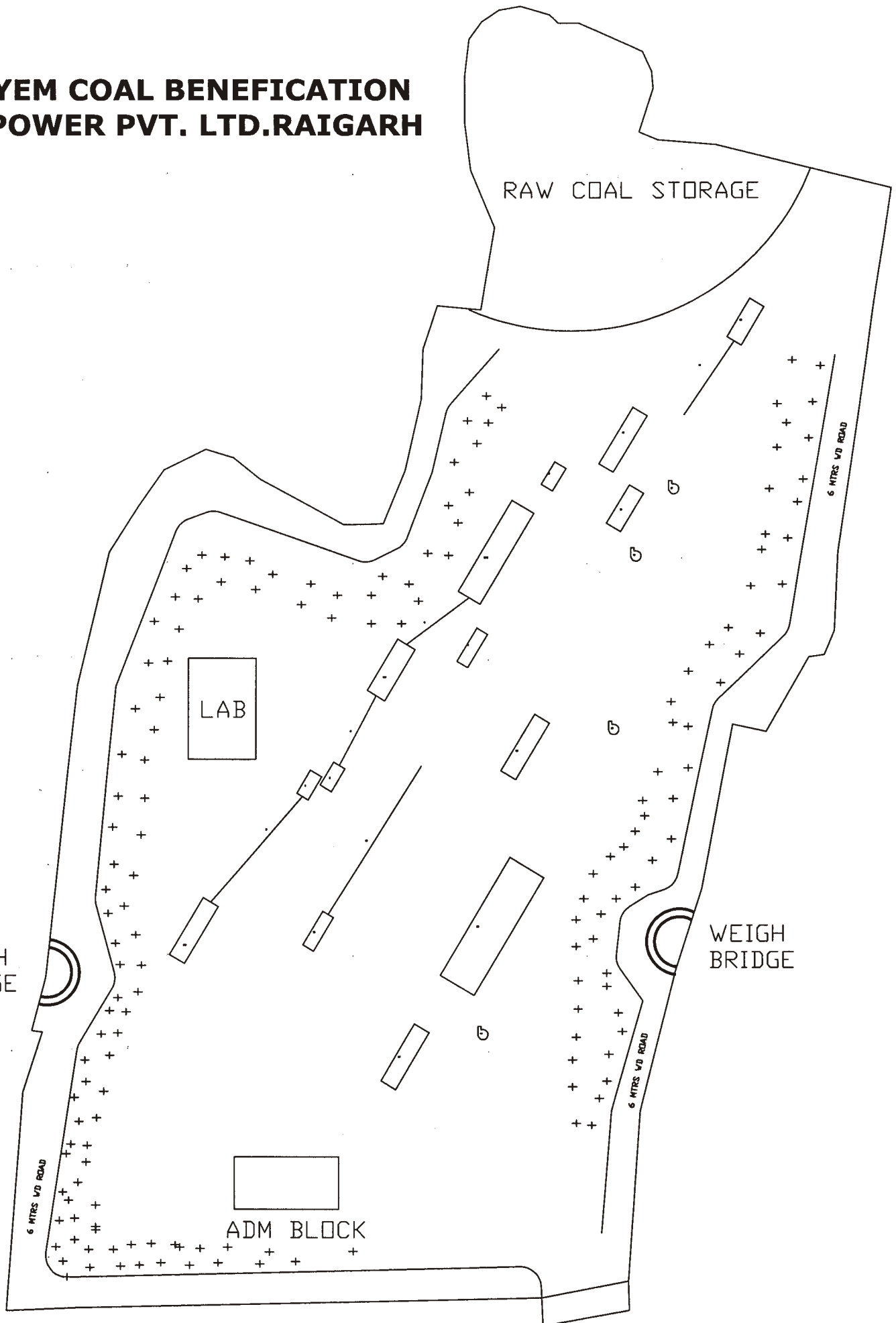
ADM BLOCK

6 MTRS V/D ROAD

6 MTRS V/D ROAD

6 MTRS V/D ROAD

**PROPOSED LAY-OUT PLAN**



| SL NO | DESCRIPTION                | UNIT |
|-------|----------------------------|------|
| 1     | RAW COAL HOOPER            | 2    |
| 2     | VIBREO FEEDER              | 2    |
| 3     | R.C.SCREEN FEER CONVY      | 1    |
| 4     | SINGLE DECK SCREEN         | 1    |
| 5     | ROLL CRUSHER               | 1    |
| 6     | BUNKER FEED CONV           | 1    |
| 7     | BUNKER 200 MT CAP          | 1    |
| 8     | VIB FEEDER FOR BARREL FEED | 1    |
| 9     | WASERY FEED CONV           | 1    |
| 10    | FEED LOUNDER               | 1    |
| 11    | 8FT X 38 FT BARREL WASHER  | 1    |
| 12    | STATIC SIEVE               | 1    |
| 13    | VIB SCREEN FOR CLEAN       | 1    |
| 14    | CLEAN COAL COVN            | 1    |
| 15    | CLEAN COAL HOOPER          | 1    |
| 16    | FEED TANK                  | 1    |
| 17    | LOUNDER FEED PUMP          | 1    |
| 18    | BARREL FEED PUMP           | 2    |
| 19    | VIB SCREEN FOR REJECT      | 1    |
| 20    | REJECT CONV                | 1    |
| 21    | REJECT COAL HOOPER         | 1    |
| 22    | RECYCLED WATER PUMP        | 1    |
| 23    | CLAIRIFIER                 | 1    |
| 24    | AGITATOR HOLDON TANK       | 1    |
| 25    | BELT PRESS                 | 1    |
| 26    | FILTERATE PUMP             | 1    |



# BHARAT ALUMINIUM COMPANY LIMITED

P. O. Balco Nagar, Korba (C.G.), INDIA Pin - 495 684

Phone : (07759) 242005, 242001 Fax : (07759) 242169

---

Date :15.04.2009

To,

**JayemCoal Beneficiation and Power Pvt .Ltd**  
**Gram – Khedapali**  
**Tahsil – Dharamjaigarh**  
**District: Raigarh**

**Subject : Your Letter No JCBPPL/BALCO/01dated 15 April 09.**

With reference to your letter above for your offer for washing of Linkage coal nearly 1 Million Tones, we are expressing our interest to wash our linkage coal 1 million tones at your washery provided we need your offer to be techno – commercially viable to us.

For

**Bharat Aluminum Company Limited,**

  
  
**Vernon Morais**  
**General Manager – Commercial.**



# R.R. ENERGY LIMITED

REGD. OFFICE : At. Po.: Garhumaria, NH-200, Jharsuguda Road

Dist.- RAIGARH (C.G.) 496 004

TEL.: +91-7762-233385, 233387, 233386 (Fax)

E-mail : rrenergylimited@rediffmail.com

Ref No. ....

Date ... 2/12/2008

To,  
Shri Amar Agrawalji, (Director)  
Jayem Coal Beneficiation & Power Pvt Ltd  
Khedapali, Dist Raigarh

Subject Requirement of coal fines / Coal rejects.

Sir,

We are running a 15 MW thermal power plant at orrisa road, Raigarh. We have already applied for 20 MW expansion, whose application is under process. We are hope full that the expansion will be accorded to us within three months. After the expansion we will require about 1000 Mt/day coal fines / coal rejects.

Hope you would supply the same.

Thanks

Yours Truly

For RR Energy Ltd.

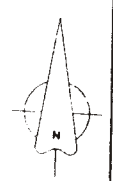
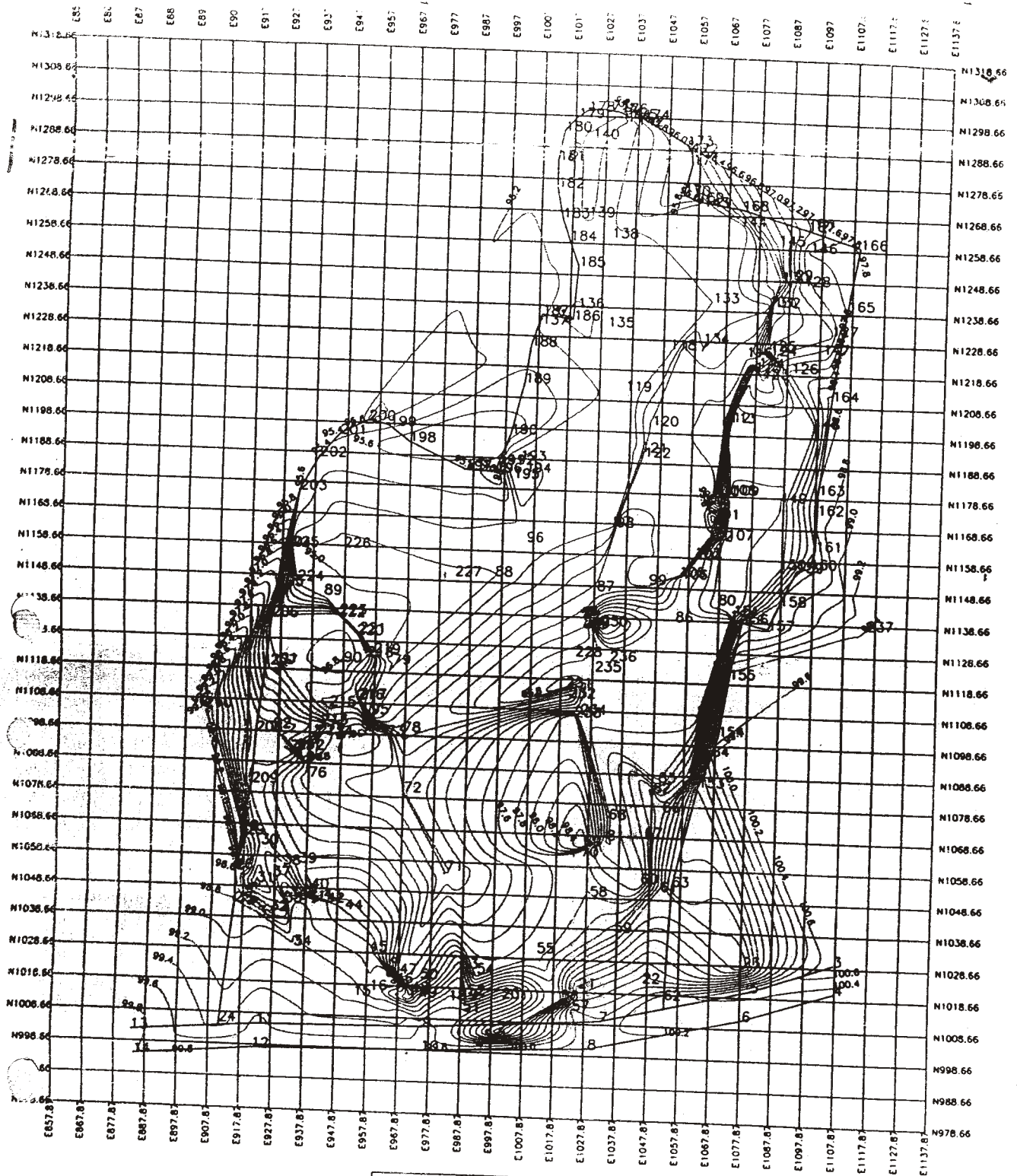
(Ashish Agrawal)

General Manager

# Proposed location of M/s Jayem Coal Benefication & Power Pvt. Ltd.



Part of toposheet no. 64N/4

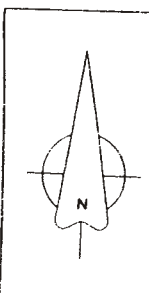
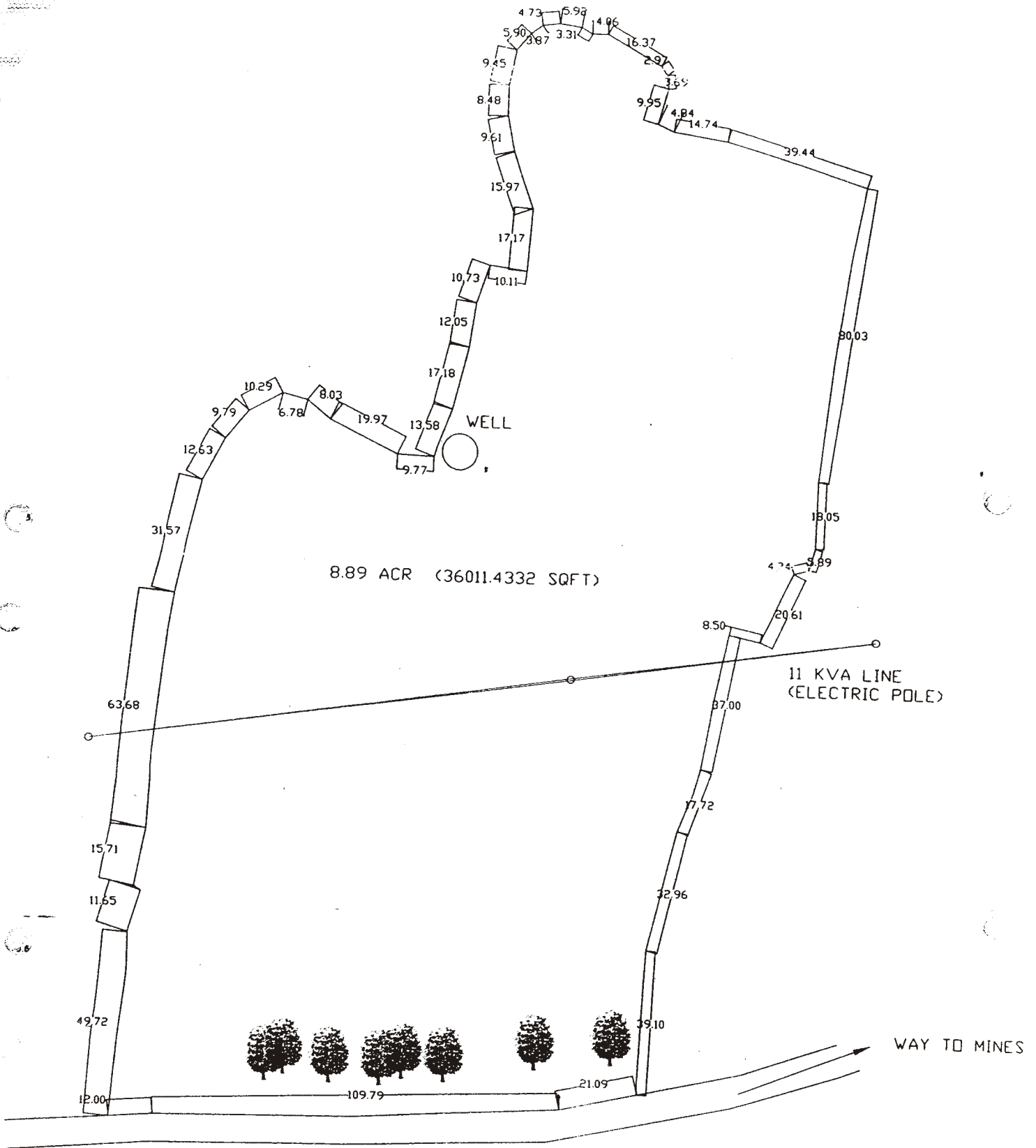


SURVEY PLAN OF PROPOSED  
LAND FOR JAYEM COAL  
BENEFICATION AND POWER  
PVT.LTD

DRG. NO 111/2007

ER. RAJEEV SA  
9827194408

113 ICCR T.P. NAGAR  
KORBA C.G.

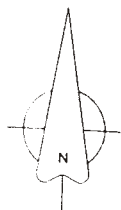
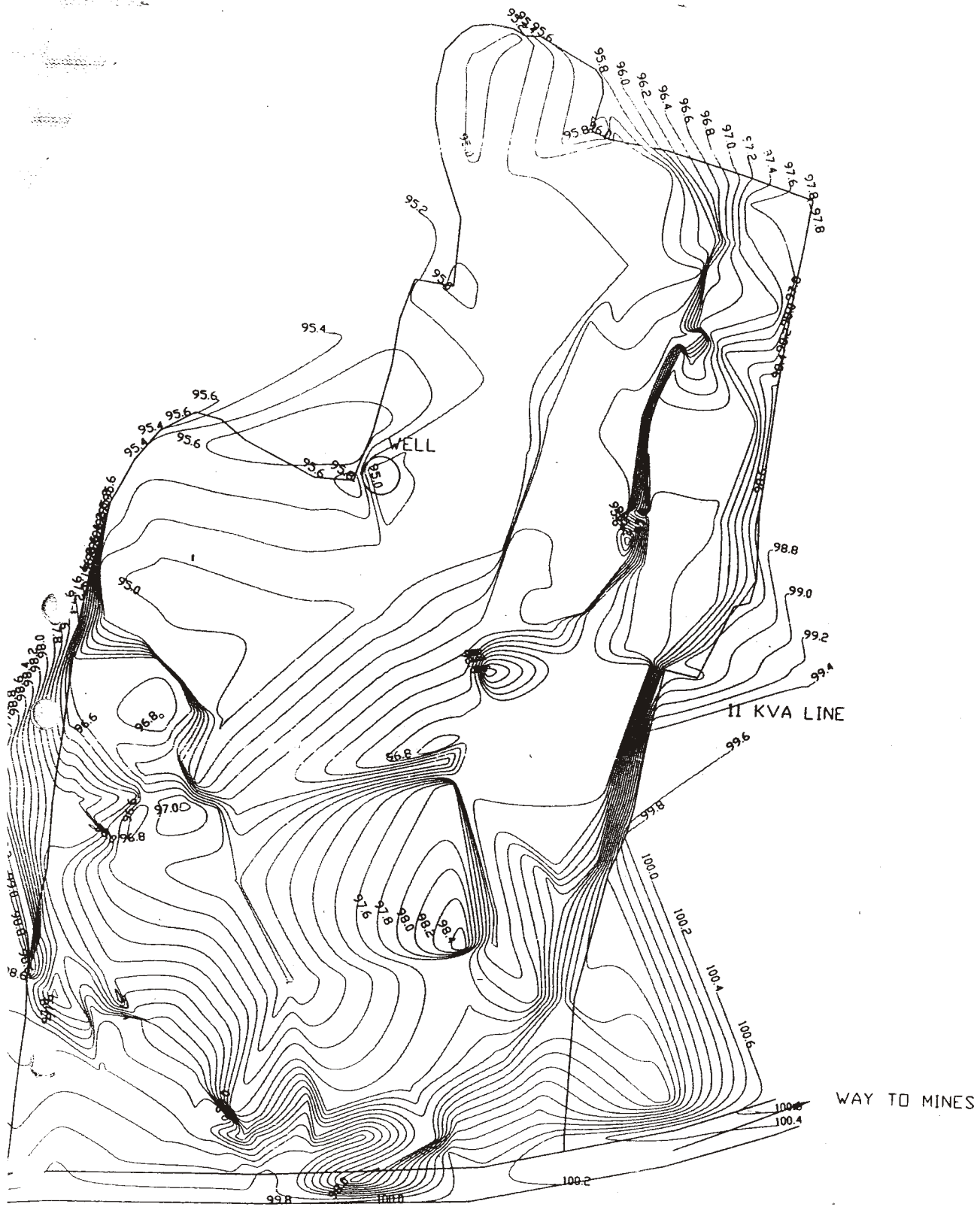


SURVEY PLAN OF PROPOSED  
 LAND FOR JAYEM COAL  
 BENEFICATION AND POWER  
 PVT.LTD

DRG. NO. 111/2007

ER. RAJ  
 982719.

113 ICCR T.P. NAGAR  
 KORBA C.G.



SURVEY PLAN OF PROPOSED  
 LAND FOR JAYEM COAL  
 BENEFICATION AND POWER  
 PVT.LTD

DRG. NO. 111/2007

ER. RAJEEV SAHU  
 9827194408

113 ICCR TP. NAGAR  
 KORBA C.G.



## Chapter Three

# Baseline Environmental Status

# Chapter 3 Baseline

## Environmental Status

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### **3.1 INTRODUCTION**

The baseline environment quality represents the background environmental scenario of various environmental components such as air, water, noise, land, and socio economic status of the study area. The sources of emission in the study area are the emission from this plant, vehicular traffic, agricultural fields, unpaved roads and fuel burning.

The identification of impacts for the proposed project activities was carried out by collecting baseline data for various environmental aspects like air, water, noise, biota, land, etc, which involved undertaking of cause-effect relationship between an activity and environmental parameters. This relationship was used for identification of effects at different level.

### **3.2 ENVIRONMENTAL SETTING OF THE PROPOSED PROJECT**

An important step in detailing the environmental setting is to prepare an adequate description of the physical, chemical, biological, cultural and socio-economic environments and selection of their environmental factors or environmental indicative parameters.

Therefore, one of the first steps in the environmental impact assessment process is to describe the environmental setting for the area under consideration. A proper description of the environmental

setting provides baseline information necessary to assess the predicted impacts associated with the project under consideration.

### 3.3 PROJECT SETTING

The proposed site for M/s Jayem Coal Benefication and Power (P) Limited is located about 15 Km from Kharsia block of Dist Raigarh Chhattisgarh State. Project area is located in the map of survey of India having no.64 N/4. Proposed project is coming up at village Khedapali. Details of project setting given below:

**Table 3.1**  
**Details of Project Settings**

| Sr. No. | Particulars                          | Details                  |
|---------|--------------------------------------|--------------------------|
| 1.      | Location                             | :                        |
| a.      | Village                              | : khedapali              |
| b.      | Tehsil                               | : Kharsia                |
| c.      | District                             | : Raigarh                |
| d.      | State                                | : Chhattisgarh           |
| e.      | Latitude                             | : 22°06'27" N            |
| f.      | Longitude                            | : 83°07'58" E            |
| g.      | Water Source                         | : Bore Well / River      |
| 2.      | Elevation above Mean Sea Level       | : 886 fts                |
| 3.      | Nearest National Highway             | : National Highway – 200 |
| 4.      | Nearest Railway station              | : Kharsia – 18 km        |
| 5.      | Nearest Airport                      | : Bilaspur – 117 km      |
| 6.      | Tourist Places                       | : No                     |
| 7.      | Archaeological important places      | : Nil                    |
| 8.      | Ecological Sensitive Areas (Wildlife | : Nil                    |

|     | Sanctuaries)                                  |   |                                                                                                               |
|-----|-----------------------------------------------|---|---------------------------------------------------------------------------------------------------------------|
| 9.  | Reserved/Protected Forest within 10-km radius | : | Nil                                                                                                           |
| 10. | Industries in 10-km radius                    | : | 01 Coal washery                                                                                               |
| 11. | Nearest Town/City                             | : | kharsia at 18 km                                                                                              |
| 12. | Nearest Villages                              | : | Bandhapali - 0.8 km                                                                                           |
| 13. | Nearest River                                 | : | Mand River - 2.1 km – W                                                                                       |
| 14. | Nearest Reservoir                             | : | Bandhapali Lake – 0.5 km                                                                                      |
| 15. | Nearest Hill Ranges                           | : | Nil                                                                                                           |
| 16. | Seismic Zone                                  | : | Nil                                                                                                           |
| 17. | Defense Installation                          | : | Nil                                                                                                           |
| 18. | Annual Climatic Conditions                    | : | Max. Temperature 46oC<br>Min Temperature 04oC<br>Avg Rainfall 1300 mm<br>Max. RH (%) 100%<br>Min. RH (%) 07 % |

### 3.4 METEOROLOGY

The tropical climate of the region is manifested in hot and humid summer, moderate monsoon and mild winter seasons. May is generally the hottest month in the year. The maximum temperature during the daytime was recorded as 46°C and January the coldest with the temperature during the daytime falling down to about 27 °C. The night temperature in winter can be as low as 4°C. The period between March and November is very humid and sticky daytime. The months of January and February are considered to have pleasant climate.

#### 3.4.1 Temperature

Summer month is extremely hot in the area where the temperature goes up to 46°C in the month of May. April, May and June are the hottest months, when average temperature is high. In winter,

temperature goes down to 4°C in the month of December. November, December and January are the coldest months.

### 3.4.2 Relative Humidity

The relative humidity varies from season to season. The Maximum relative humidity is observed around 100%. The minimum relative humidity is observed around 7%.

### 3.4.3 Rainfall

Monsoon in the area comes from South -Westerly winds. The average annual rainfall is around 1300 mm.

### 3.4.4 Wind Speed and Wind Direction

The predominant direction of the wind is mostly from NNE, NE and SW . The calm was observed 79.8 % of the total time. Maximum wind speed was observed 24 KMPH.. Maximum mean wind speed was observed in the month of May. The windrose diagram is also depicted in **Fig. 3.1 (A) to (C)**

**Table 3.2**

METEOROLOGICAL DATA MONTH OF -15 th October to 14th November- 08

| Date | Temperature °C |      |     | Relative Humidity % |      |     | Morning   |            | Evening   |            | Cloudiness % |      |
|------|----------------|------|-----|---------------------|------|-----|-----------|------------|-----------|------------|--------------|------|
|      | Max            | Avg. | Min | Max                 | Avg. | Min | Wind Dirt | Wind Speed | Wind Dirt | Wind Speed | Mor          | Eve. |
| 15   | 32             | 28   | 24  | 89                  | 72   | 56  | C         | 0          | C         | 0          | 40           | 40   |
| 16   | 31             | 28   | 24  | 84                  | 78   | 64  | N         | 4          | NE        | 7          | 50           | 50   |
| 17   | 32             | 28   | 25  | 91                  | 77   | 57  | ENE       | 7          | NNE       | 4          | 50           | 10   |
| 18   | 33             | 29   | 25  | 89                  | 70   | 52  | C         | 0          | NE        | 4          | 10           | 30   |
| 19   | 33             | 29   | 25  | 92                  | 77   | 53  | E         | 4          | C         | 0          | 30           | 10   |
| 20   | 31             | 27   | 23  | 89                  | 74   | 58  | C         | 0          | NNE       | 4          | 40           | 50   |
| 21   | 32             | 28   | 24  | 92                  | 69   | 48  | NNE       | 4          | NE        | 9          | 30           | 40   |
| 22   | 30             | 26   | 22  | 90                  | 74   | 51  | NE        | 9          | W         | 6          | 10           | 60   |
| 23   | 26             | 24   | 23  | 95                  | 84   | 77  | NNW       | 9          | NW        | 9          | 80           | 60   |
| 24   | 28             | 26   | 23  | 95                  | 85   | 71  | WSW       | 9          | WSW       | 15         | 60           | 30   |

|    |    |    |    |     |    |    |     |     |     |   |    |    |
|----|----|----|----|-----|----|----|-----|-----|-----|---|----|----|
| 25 | 31 | 28 | 24 | 96  | 81 | 61 | SSW | 15  | SSW | 6 | 60 | 10 |
| 26 | 31 | 28 | 24 | 100 | 79 | 58 | SW  | 4   | C   | 0 | 10 | 40 |
| 27 | 31 | 27 | 23 | 97  | 81 | 55 | C   | 0   | S   | 4 | 80 | 30 |
| 28 | 31 | 28 | 24 | 89  | 75 | 54 | SW  | 7   | C   | 0 | 10 | 10 |
| 29 | 32 | 28 | 24 | 92  | 80 | 65 | C   | 0   | C   | 0 | 30 | 40 |
| 30 | 32 | 28 | 24 | 99  | 83 | 57 | SW  | 4   | C   | 0 | -- | 50 |
| 1  | 31 | 28 | 24 | 96  | 78 | 54 | C   | 0   | C   | 0 | 30 | 10 |
| 2  | 31 | 28 | 25 | 93  | 75 | 62 | C   | 0   | C   | 0 | 30 | 30 |
| 3  | 32 | 28 | 24 | 93  | 67 | 47 | C   | 0   | N   | 6 | 10 | 30 |
| 4  | 32 | 28 | 25 | 80  | 72 | 56 | NE  | 6   | C   | 0 | 50 | 30 |
| 5  | 32 | 28 | 24 | 95  | 75 | 58 | NE  | 6   | C   | 0 | 40 | 10 |
| 6  | 32 | 29 | 23 | 88  | 74 | 60 | C   | 0   | C   | 0 | 10 | 30 |
| 7  | 32 | 28 | 23 | 84  | 62 | 27 | C   | 0   | C   | 0 | 30 | 10 |
| 8  | 31 | 28 | 24 | 79  | 64 | 39 | C   | 0   | C   | 0 | 30 | 10 |
| 9  | 33 | 28 | 22 | 87  | 60 | 29 | NNE | 104 | C   | 0 | -- | -- |
| 10 | 33 | 28 | 22 | 87  | 67 | 41 | C   | 0   | C   | 0 | -- | 10 |
| 11 | 32 | 26 | 21 | 87  | 63 | 31 | C   | 0   | C   | 0 | 10 | 10 |
| 12 | 32 | 26 | 21 | 85  | 59 | 25 | C   | 0   | C   | 0 | 10 | 10 |
| 13 | 32 | 26 | 20 | 84  | 59 | 30 | C   | 0   | C   | 0 | 10 | -- |
| 14 | 32 | 26 | 19 | 81  | 57 | 25 | C   | 0   | C   | 0 | -- | 10 |

**METEOROLOGICAL DATA MONTH OF -15th November to 14th December- 08**

| Date | Temperature °C |      |     | Relative Humidity % |      |     | Morning   |            | Evening   |            | Cloudiness % |      |
|------|----------------|------|-----|---------------------|------|-----|-----------|------------|-----------|------------|--------------|------|
|      | Max            | Avg. | Min | Max                 | Avg. | Min | Wind Dirt | Wind Speed | Wind Dirt | Wind Speed | Mor          | Eve. |
| 15   | 32             | 26   | 19  | 87                  | 54   | 24  | C         | 0          | C         | 0          | --           | --   |
| 16   | 31             | 24   | 16  | 100                 | 68   | 35  | C         | 0          | C         | 0          | --           | --   |
| 17   | 31             | 26   | 21  | 83                  | 62   | 38  | C         | 0          | C         | 0          | --           | 10   |
| 18   | 31             | 26   | 22  | 92                  | 64   | 42  | C         | 0          | C         | 0          | --           | 10   |
| 19   | 31             | 27   | 23  | 77                  | 58   | 33  | C         | 0          | C         | 0          | --           | --   |
| 20   | 32             | 26   | 21  | 76                  | 57   | 25  | C         | 0          | C         | 0          | --           | --   |
| 21   | 32             | 25   | 18  | 88                  | 60   | 27  | C         | 0          | C         | 0          | --           | --   |
| 22   | 19             | -    | 19  | 77                  | 77   | 77  | C         | 0          | C         | 0          | --           | --   |
| 23   | 32             | 25   | 18  | 80                  | 51   | 21  | C         | 0          | C         | 0          | --           | 10   |
| 24   | 31             | 24   | 18  | 70                  | 48   | 19  | NNE       | 6          | C         | 0          | --           | --   |

|    |    |    |    |    |    |    |    |   |   |   |    |    |
|----|----|----|----|----|----|----|----|---|---|---|----|----|
| 25 | 31 | 24 | 18 | 74 | 49 | 20 | C  | 0 | C | 0 | -- | -- |
| 26 | 31 | 24 | 17 | 78 | 51 | 25 | C  | 0 | E | 4 | -- | -- |
| 27 | 30 | 24 | 17 | 72 | 53 | 32 | C  | 0 | C | 0 | -- | -- |
| 28 | 30 | 24 | 18 | 88 | 66 | 36 | C  | 0 | C | 0 | -- | -- |
| 29 | 30 | 24 | 18 | 86 | 65 | 39 | C  | 0 | C | 0 | -- | 10 |
| 30 | 30 | 24 | 18 | 87 | 67 | 44 | C  | 0 | E | 4 | -- | 30 |
| 31 | 30 | 26 | 23 | 88 | 74 | 58 | NE | 9 | C | 0 | 10 | 50 |
| 1  | 34 | 28 | 23 | 89 | 71 | 40 | C  | 0 | C | 0 | 40 | 30 |
| 2  | 30 | 26 | 22 | 96 | 82 | 61 | C  | 0 | C | 0 | 40 | 10 |
| 3  | 31 | 27 | 23 | 94 | 76 | 52 | C  | 0 | C | 0 | 30 | 10 |
| 4  | 31 | 26 | 22 | 90 | 70 | 42 | E  | 4 | N | 4 | -- | -- |
| 5  | 31 | 24 | 18 | 89 | 53 | 19 | C  | 0 | C | 0 | -- | -- |
| 6  | 31 | 24 | 16 | 82 | 66 | 40 | C  | 0 | C | 0 | -- | -- |
| 7  | 31 | 24 | 17 | 87 | 61 | 28 | C  | 0 | C | 0 | -- | -- |
| 8  | 31 | 24 | 17 | 86 | 56 | 25 | C  | 0 | C | 0 | -- | -- |
| 9  | 31 | 24 | 17 | 83 | 60 | 31 | C  | 0 | C | 0 | -- | -- |
| 10 | 31 | 24 | 17 | 82 | 64 | 38 | C  | 0 | C | 0 | -- | -- |
| 11 | 31 | 24 | 17 | 87 | 63 | 35 | C  | 0 | C | 0 | -- | -- |
| 12 | 31 | 24 | 18 | 84 | 62 | 33 | S  | 2 | C | 0 | -- | -- |
| 13 | 30 | 23 | 16 | 70 | 52 | 24 | C  | 0 | C | 0 | -- | -- |
| 14 | 30 | 23 | 16 | 83 | 53 | 27 | C  | 0 | C | 0 | -- | -- |

**METEOROLOGICAL DATA MONTH OF -15th December 08 to 14th January- 09**

| Date | Temperature °C |      |     | Relative Humidity % |      |     | Morning   |            | Evening   |            | Cloudiness % |      |
|------|----------------|------|-----|---------------------|------|-----|-----------|------------|-----------|------------|--------------|------|
|      | Max            | Avg. | Min | Max                 | Avg. | Min | Wind Dirt | Wind Speed | Wind Dirt | Wind Speed | Mor          | Eve. |
| 15   | 28             | 22   | 16  | 63                  | 49   | 30  | N         | 4          | C         | 0          | --           | --   |
| 16   | 29             | 23   | 17  | 68                  | 49   | 26  | C         | 0          | C         | 0          | --           | --   |
| 17   | 26             | 20   | 15  | 83                  | 59   | 39  | NE        | 4          | C         | 0          | --           | 40   |
| 18   | 29             | 24   | 18  | 71                  | 51   | 32  | SSW       | 7          | C         | 0          | 30           | 30   |
| 19   | 29             | 23   | 17  | 82                  | 59   | 38  | C         | 0          | C         | 0          | 10           | 10   |
| 20   | 29             | 22   | 16  | 82                  | 52   | 25  | C         | 0          | C         | 0          | --           | --   |
| 21   | 28             | 20   | 13  | 77                  | 50   | 24  | C         | 0          | C         | 0          | --           | --   |
| 22   | 28             | 20   | 13  | 81                  | 51   | 22  | C         | 0          | NE        | 6          | --           | --   |
| 23   | 27             | 20   | 12  | 74                  | 48   | 28  | NE        | 4          | C         | 0          | --           | --   |
| 24   | 27             | 20   | 13  | 84                  | 59   | 30  | C         | 0          | C         | 0          | --           | --   |

|    |    |    |    |    |    |    |     |   |   |   |    |    |
|----|----|----|----|----|----|----|-----|---|---|---|----|----|
| 25 | 28 | 21 | 14 | 82 | 53 | 29 | C   | 0 | C | 0 | -- | -- |
| 26 | 28 | 21 | 14 | 77 | 58 | 29 | C   | 0 | C | 0 | -- | -- |
| 27 | 28 | 21 | 14 | 84 | 55 | 23 | C   | 0 | C | 0 | -- | -- |
| 28 | 28 | 20 | 12 | 71 | 50 | 17 | C   | 0 | C | 0 | -- | -- |
| 29 | 28 | 20 | 12 | 75 | 49 | 16 | C   | 0 | C | 0 | -- | -- |
| 30 | 28 | 20 | 13 | 67 | 45 | 19 | C   | 0 | C | 0 | -- | -- |
| 1  | 28 | 20 | 13 | 80 | 49 | 18 | C   | 0 | C | 0 | -- | 10 |
| 2  | 27 | 20 | 14 | 72 | 50 | 25 | C   | 0 | C | 0 | 50 | 10 |
| 3  | 20 | 17 | 14 | 79 | 62 | 49 | C   | 0 | C | 0 | -- | -- |
| 4  | 27 | 21 | 15 | 69 | 50 | 20 | NNE | 9 | C | 0 | -- | 10 |
| 5  | 27 | 20 | 14 | 72 | 44 | 17 | N   | 6 | C | 0 | -- | 10 |
| 6  | 26 | 20 | 13 | 63 | 53 | 29 | C   | 0 | C | 0 | -- | 10 |
| 7  | 26 | 20 | 13 | 68 | 48 | 24 | C   | 0 | C | 0 | 30 | -- |
| 8  | 27 | 20 | 13 | 81 | 60 | 36 | NE  | 4 | C | 0 | -- | -- |
| 9  | 26 | 20 | 13 | 80 | 64 | 40 | C   | 0 | C | 0 | -- | -- |
| 10 | 27 | 20 | 13 | 77 | 55 | 29 | C   | 0 | C | 0 | -- | -- |
| 11 | 28 | 20 | 13 | 76 | 58 | 26 | C   | 0 | C | 0 | -- | -- |
| 12 | 29 | 22 | 15 | 81 | 63 | 38 | C   | 0 | C | 0 | -- | -- |
| 13 | 28 | 22 | 15 | 79 | 59 | 30 | S   | 4 | C | 0 | -- | -- |
| 14 | 29 | 22 | 14 | 79 | 52 | 19 | C   | 0 | C | 0 | -- | 10 |



**Table- 3.3**  
**Summary of Meteorological Data**

| Month          | Wind Speed (kmph) |      |           | Temperature (°C) |         |        | Relative Humidity (%) |         |        | Rain Fall * (mm) |                  |                   | Cloud Cover * (Octas of sky) |
|----------------|-------------------|------|-----------|------------------|---------|--------|-----------------------|---------|--------|------------------|------------------|-------------------|------------------------------|
|                | Mean              | Max. | % of calm | Mean (Dry Bulb)  | Highest | Lowest | Mean                  | Highest | Lowest | Total            | 24-hours highest | No. of rainy days | Mean                         |
| Oct-Nov 2008   | 4.61              | 104  | 58.4      | 27.5             | 33      | 19     | 72.36                 | 100     | 25     | Nil              | Nil              | Nil               | 3/8                          |
| Nov - Dec 2008 | 2.2               | 9    | 88.7      | 24.75            | 34      | 16     | 61.96                 | 100     | 19     | Nil              | Nil              | Nil               | 3/8                          |
| Dec - Jan 09   | 2.2               | 9    | 85.1      | 20.7             | 29      | 12     | 53.46                 | 84      | 16     | Nil              | Nil              | Nil               | 3/8                          |

### 3.5 AIR ENVIRONMENT

In order to identify the background air quality data and also to represent the interference from various local activities, screening techniques have been used for identification of air quality station in the study area.

No major sources of pollution in the area has been identified in the 10 km radius, which may be considered for contribution to the existing ambient air quality.

The air pollution-monitoring network was designed to know the complex environmental scenario that exists as of now which would serve as baseline information prevailing in the area.

#### 3.5.1 Ambient Air Quality

Ambient air quality of the study area has been assessed through a network of 10 ambient air quality locations, which shown in **Fig 3.2**.

- While deciding the number of AAQ monitoring stations, the guidelines of United States Environmental Protection Agency (USEPA), 1975 was used. According to this guideline, for a population of upto 1,00,000 in study area, a minimum of four (4) AAQ monitoring stations should be set up. In the present study, 8 AAQ monitoring stations have been setup (population in study area is less than 1,00,000).

In order to fix the locations of the monitoring stations a model suggested by Houghland and Stephens (Ref: The Design of Air Quality Monitoring Network: R.E. Munn, 1981) has been used. This model suggests setting up of monitoring stations at those locations where ground level concentration (GLC) is high.

**Table-3.4**  
**Details of Ambient Air Quality Monitoring Stations**

| <b>STATION CODE</b> | <b>LOCATION</b> | <b>DISTANCE TO PROPOSED PLANT [KM]</b> | <b>DIRECTION TO PLANT</b> |
|---------------------|-----------------|----------------------------------------|---------------------------|
| A-1                 | Khedhapali      | 1.3                                    | S                         |
| A-2                 | Bandhapali      | 0.8                                    | NE                        |
| A-3                 | Edu             | 2.7                                    | S                         |
| A-4                 | Bojia           | 3.5                                    | NE                        |
| A-5                 | Chhal           | 2.7                                    | NW                        |
| A-6                 | Nawapara        | 2.0                                    | NE                        |
| A-7                 | Chhirpan        | 6.3                                    | W                         |
| A-8                 | Dehjari         | 6.4                                    | S                         |

### 3.5.2 Analysis of Baseline Concentrations

The methods of sample collection, equipment used and analysis procedure as followed are given below:

#### Methodology Of Sampling & Analysis And Equipment Used

| <b>S. No.</b> | <b>Parameters</b>                  | <b>Instrument / Apparatus used</b>                                | <b>Method followed</b> | <b>Reference</b>             |
|---------------|------------------------------------|-------------------------------------------------------------------|------------------------|------------------------------|
| 1.            | Suspended Particulate Matter (SPM) | High volume, Air Sampler (HVAS), Filter Paper (EPM-2000), Balance | Gravimetry             | CPCB Notification of 11-4-94 |
| 2.            | Respirable Particulate Matter      | Respirable Dust Sampler (RDS) Filter Paper                        | Gravimetry             |                              |

|    |                                          |                                                          |                                                                 |                                    |
|----|------------------------------------------|----------------------------------------------------------|-----------------------------------------------------------------|------------------------------------|
|    | (RPM)                                    | (EPM-2000),<br>Balance                                   |                                                                 |                                    |
| 3. | Nitrogen<br>Oxides<br>(NO <sub>x</sub> ) | HVAS with<br>Impinger<br>tubes,<br>spectrophotom<br>eter | Jacobs and<br>Hochheiser<br>modified<br>(Naarsenite<br>) Method | CPCB<br>notification of<br>11-4-94 |
| 4. | Sulphur<br>dioxide<br>(SO <sub>2</sub> ) | HVAS with<br>Impinger<br>tubes,<br>spectrophotom<br>eter | Improved<br>West &<br>Gaecke<br>method                          | CPCB<br>notification of<br>11-4-94 |
| 5. | Carbon<br>Monoxide                       | CO Analyser                                              | NDIR<br>Method                                                  | CPCB<br>notification of<br>11-4-94 |

Sampling at eight stations were carried out for one season i.e. three months post monsoon and winter season during period 15<sup>th</sup> October, 2008 – 14<sup>th</sup> January, 2009. The sampling frequency was twice a week for 24 hours duration over period of one month per season. The parameters monitored were SPM, RSPM, SO<sub>2</sub>, NO<sub>x</sub>. In above parameter also measured was Carbon Monoxide (CO).

Ambient air quality status of the area can be summarised as follows:

#### **Suspended Particulate Matter – SPM**

Suspended particulate matter monitored in the study area showed 98<sup>th</sup> percentile values in the range of 106.3 – 148.1 µg/m<sup>3</sup>. The SPM concentration in the study area was found to be well within the norms of NAAQ prescribed for Rural and residential areas.

#### **Respirable Particulate Matter – RPM**

RPM values monitored at all locations showed 98<sup>th</sup> percentile values in the range of 32.7 – 56.2 µg/m<sup>3</sup>. Highest value of 56.2 µg /m<sup>3</sup> was

recorded at Near Chhal. However, this value is well within the limits of NAAQ.

### **Sulphur Di Oxide – SO<sub>2</sub>**

98<sup>th</sup> percentile value of Sulphur dioxide in the study area from the monitored data was in the range of 6.2– 22.9 µg/m<sup>3</sup>. Maximum value of Sulphurdioxide of 22.9 µg/m<sup>3</sup> obtained near the sampling station located at Chhal. The values of SO<sub>2</sub> monitored in the study area are well within the limits of NAAQ standards.

### **Oxides of Nitrogen – NO<sub>x</sub>**

Ambient air quality status monitored for Nitrogen oxides in the study area were in the range with 98<sup>th</sup> percentile values between 5.9 – 20.6 µg/m<sup>3</sup>. A maximum value of 20.6 µg/m<sup>3</sup> was prevailing at the time of sampling at Chhal.

### **Carbon Monoxide – CO**

CO concentration at all the locations was found to be less than 1 ppm.

## **3.5.3 OVERALL BASELINE AMBIENT AIR QUALITY**

Results of the ambient air quality at all the above locations were found to be well within the limits of National Ambient Air Quality (NAAQ) standards specified for Residential and Industrial areas. Concentrations of SPM, RPM, SO<sub>2</sub>, and NO<sub>x</sub> are mainly contributed due to vehicular traffic and local activities.

The 98<sup>th</sup> percentile values of SPM, RPM, SO<sub>2</sub> and NO<sub>x</sub> at all the locations in the study area .

**Table-3.5**

### **Summary of Ambient Air Quality (µg/m<sup>3</sup>)**

| CODE<br>NO | Location<br>Name | 98 <sup>th</sup> Percentile Values |      |                 |                 |
|------------|------------------|------------------------------------|------|-----------------|-----------------|
|            |                  | SPM                                | RPM  | SO <sub>2</sub> | NO <sub>x</sub> |
| A-1        | Khedapali        | 110.4                              | 39.4 | 09.8            | 08.5            |

|     |             |       |      |      |      |
|-----|-------------|-------|------|------|------|
| A-2 | Banadhapali | 106.3 | 32.7 | 06.2 | 05.9 |
| A-3 | Edu         | 123.1 | 47.7 | 11.7 | 10.4 |
| A-4 | Bojia       | 116.4 | 44.6 | 14.1 | 13.4 |
| A-5 | Chhal       | 148.1 | 56.2 | 22.9 | 20.6 |
| A-6 | Nawapara    | 108.6 | 35.8 | 11.3 | 10.8 |
| A-7 | Chhirpan    | 112.3 | 40.7 | 10.8 | 09.4 |
| A-8 | Dehjari     | 108.6 | 37.7 | 09.6 | 06.8 |

**Note: CO values are observed less than 1 ppm during study periods.**

An assessment of the existing air quality is required to establish the reference level. To accomplish this, Ambient Air Quality Monitoring (AAQM) Stations were set up within 10 Kms radius of plant site. Details has been given as **Annexure-1**

### 3.5.4 Fugitive and Source Emission

#### Source Emission

As such there would be no source emission, because nun of the fuel or stack is required in the washery operation. Any type of combustion will not be there.

#### Fugitive Emission

Possibility of air pollution will be there from various transfer points and conveyor belts. However fugitive emission due to vehicle movement will be there. This would be responsible for the deterioration in the environmental quality to some extent. After obtaining air quality criteria for various pollutants, need has been felt about controlling them.

The best way to do this is to control the emission of the pollutants at their source itself. The reasons for measuring emission may be one or more of the following:

- ❖ To obtain data concerning the emissions for compiling an emissions inventory or to identify a predominant source in the area.
- ❖ To determine compliance with regulations.
- ❖ To gather information this will enable selection of appropriate control equipment.
- ❖ To determine the efficiency of control equipments installed to reduce emissions.

### 3.6 NOISE ENVIRONMENT

The acoustical environment varies dynamically in magnitude and character through out most communities. The noise level variation can be temporal, spectral and spatial. The residential noise level is that level below which the ambient noise does not seem to drop down during the given interval of time and is generally characterized by unidentified sources. Ambient noise level is characterized by significant variations above a base or a residential noise level. The maximum impact of noise is felt on urban areas, which is mostly due to the commercial activities and vehicular movement during peak hours of the day.

Measured noise level displayed as a function of time provides a useful scheme for describing the acoustical climate of a community. Noise levels recorded at each station with a time interval of about 30 minutes are computed for equivalent noise levels. Equivalent noise level is a single number descriptor for describing time varying noise levels. The equivalent noise level is defined as mathematically.

$$10 \text{ Log } 1/T \sum (10^{L_n/10})$$

Where L = sound pressure level a function of time dB (A)

T = Time interval of observations

Noise levels during the night time generally drop, therefore to compute equivalent noise levels for the night time, noise levels are increased by

10 dB (A) as the night time high noise levels are judged more annoying compared to the day time. Noise levels at a particular station are represented as Day - Night equivalent (Ldn). Day - night equivalent is the single number index designed to rate environmental noise on daily/24 hourly basis. Mathematically Ldn is given by

$$Ldn = 10 \log \left\{ \frac{1}{24} \left( 15 \times 10^{(Ld/10)} + 9 \times 10^{(Ln+10)/10} \right) \right\}$$

Where,

Ld = A weighed equivalent for day time period (6 am to 10 pm)

Ln = A weighed equivalent for night time period (10 pm to 6 am)

The basic steps associated with impact assessment on the noise components of the environment involve identification and evaluation of the present noise status on the general population. Therefore noise level measurement was carried out at each ambient air quality station and also within the existing plant premises.

The noise monitoring location is shown in **Fig 3.3**

Noise levels recorded were found to be in the range of 42.5 – 68.0 dB (A) during daytime and in the range of 35.25 – 36.1 dB (A) during nighttime.

**Table-3.6**  
**Noise Levels In The Study Area (10 Km Radius)**

| S. No. | Location    | Location No. | L10  | L50  | L90  | Leq  | Lday | Lnight |
|--------|-------------|--------------|------|------|------|------|------|--------|
| 1.     | Khedapali   | N-01         | 48   | 40   | 34   | 44   | 46.4 | 35.75  |
| 2.     | Banadhapali | N-02         | 42.5 | 36   | 30.4 | 52.0 | 55.3 | 33.7   |
| 3.     | Edu         | N-03         | 64.5 | 48   | 33.5 | 64.1 | 62.2 | 36.1   |
| 4.     | Bojia       | N-04         | 55   | 45   | 33   | 53.1 | 53.5 | 35.6   |
| 5.     | Chhal       | N-05         | 68   | 65.4 | 64.5 | 62.2 | 60.9 | 46.7   |
| 6.     | Nawapara    | N-06         | 64   | 48   | 35   | 62.2 | 62.5 | 36.2   |



|    |          |      |    |    |    |      |      |      |
|----|----------|------|----|----|----|------|------|------|
| 7. | Chhirpan | N-07 | 66 | 50 | 34 | 67.1 | 64.5 | 35.4 |
| 8. | Dehjari  | N-08 | 64 | 61 | 58 | 55   | 52   | 48   |

### 3.7 WATER ENVIRONMENT

#### HYDROGEOLOGY

Hydro geological investigations have been carried out in the study area which includes detailed field studies and reference of available literature. A brief note on hydrogeological conditions of the area is given below:

The study area covered by sandstone has very good porosity and permeability. Below it, the shales are comparatively poor in porosity and permeability. Unaltered shale has very limited possibilities of ground water percolation and storage. Occurrence and movement of ground water is limited to weathered and fractured portions of all these rocks.

The ground water occurs under semi-pheratic water table conditions along the joints, fractures and bedding planes. Highly weathered, jointed and fractured shale can only from good ground water repositories. The dug wells constructed in this formation are poor yielding on account of negligible movement of ground water.

A few dug wells and a few bore wells are noticed in the area. The depth of dug wells range from 5 – 15 m where as the bore wells are drilled down to 30-50 m. Discharge of the wells vary from 4 to 8 lps in general. The general depth of water level varies between 10 to 15m bgl.

Assessment of baseline data on Water environment includes

- a) Identification of surface water sources
- b) Identification of ground water sources
- c) Collection of water samples
- d) Analyzing water samples collected for physico – chemical and biological parameters

The details of the above are presented below.

Assessment of water quality in the study area includes the quality assessment of parameters as per the Indian standard IS 10500 (drinking water standard). Seven samples were collected from bore wells of the surrounding villages. The location of water sampling stations is shown in **Fig – 3.4 and Table – 3.7**

**Table – 3.7**  
**Water Sampling Locations**

| <b>Station Code</b> | <b>Location</b> | <b>Source</b> | <b>Distance From Plant Site (Km)</b> | <b>Direction Wrt Plant Site</b> |
|---------------------|-----------------|---------------|--------------------------------------|---------------------------------|
| SW1                 | Mand River      | Surface water | 2.1 km                               | W                               |
| SW2                 | Bandhapali      | Surface water | 0.5 km                               | N                               |
| SW3                 | Kurkut River    | Surface water | 3.8 km                               | SE                              |
| SW4                 | Edu             | Surface water | 2.8 km                               | S                               |
| GW1                 | Khedapali       | Borewell      | 1.1 km                               | S                               |
| GW2                 | Edu             | Borewell      | 2.8 km                               | S                               |
| GW3                 | Bandhapali      | Borewell      | 0.8 km                               | NE                              |
| GW4                 | Bojia           | Borewell      | 3.6 km                               | NE                              |

|     |          |          |        |    |
|-----|----------|----------|--------|----|
| GW5 | Chhirpan | Borewell | 6.3 km | SW |
|-----|----------|----------|--------|----|

The summary of the water quality of the samples collected is given below:

### **Surface Water**

- pH was found to be 7.1 – 7.7.
- Total dissolved solids in the sample were found to be of 1188 – 1264 mg/l.
- Total Hardness was found to be 284 – 340 mg/l.
- Chlorides concentration was found to be 18.6 – 22.2mg/l.
- Fluoride concentration was 0.4-0.6 mg/l.
- Sulphates concentration was 25 – 31 mg/l.

Water samples collected from Mand River showed compliance of all parameters with the drinking water standards of IS 10500.

### **Surrounding Borewells**

- pH was found to be 7.1 – 7.26
- Total dissolved solids in the sample were found to be of 96 – 211mg/l.
- Total Hardness was found to be 72 – 136 mg/l.
- Chlorides concentration was found to be 15 –30 mg/l.
- Fluoride concentration was 0.6 – 0.9 mg/l.
- Sulphates concentration was 84 – 102 mg/l.

All the ground water samples collected from various sources within the study area showed compliance of all parameters with the drinking water standards of IS 10500.

## Ground Water Analysis

Season: Winter

| Parameter                                             | Unit | Standard     | GW1        | GW2        | GW3        | GW4        | GW5        |
|-------------------------------------------------------|------|--------------|------------|------------|------------|------------|------------|
| pH                                                    |      | 6.5-8.5      | 7.2        | 6.9        | 6.7        | 6.75       | 7.25       |
| Colour                                                |      | Colourless   | Colourless | Colourless | Colourless | Colourless | Colourless |
| Odour                                                 |      | Unobjectable | Odourless  | Odourless  | Odourless  | Odourless  | Odourless  |
| Taste                                                 |      | Agreeable    | Agreeable  | Agreeable  | Agreeable  | Agreeable  | Agreeable  |
| Turbidity N.T.U (MAX)                                 |      | 5.0          | 3.8        | 3.3        | 3.5        | 3.1        | 3.9        |
| Total dissolved solids                                | mg/l | 500          | 103        | 126        | 136        | 227        | 206        |
| Total Hardness as CaCO <sub>3</sub>                   | mg/l | 300          | 73         | 125        | 79         | 87         | 188        |
| Chlorides as Cl.                                      | mg/l | 250          | 37         | 35         | 42         | 26         | 46         |
| Sulphate as SO <sub>4</sub>                           | mg/l | 200          | 22         | 25         | 27         | 17         | 23         |
| Free residual Chlorine                                | mg/l | 0.2          | BDL        | BDL        | BDL        | BDL        | BDL        |
| Total Alkalinity                                      | mg/l | 200          | 143        | 136        | 154        | 116        | 167        |
| Iron as Fe                                            | mg/l | 0.3          | 0.1        | 0.1        | 0.05       | 0.1        | 0.04       |
| Fluoride as F                                         | mg/l | 1.0          | BDL        | BDL        | BDL        | BDL        | 0.07       |
| Calcium as Ca                                         | mg/l | 75           | 36         | 50         | 24         | 48         | 42         |
| Manganese as Mn                                       | mg/l | 0.1          | <0.01      | <0.01      | <0.01      | <0.01      | <0.01      |
| Mineral oil                                           | mg/l | 0.01         | <0.01      | <0.01      | <0.01      | <0.01      | <0.01      |
| Cadmium as Cd                                         | mg/l | 0.01         | <0.005     | <0.005     | <0.005     | <0.005     | <0.005     |
| Zinc as Zn                                            | mg/l | 5.0          | BDL        | BDL        | BDL        | BDL        | BDL        |
| Selenium as Se                                        | mg/l | 0.01         | <0.005     | <0.005     | <0.005     | <0.005     | <0.005     |
| Nitrate as NO <sub>3</sub>                            | mg/l | 45           | 5.3        | 2.0        | 3.8        | 2.3        | 3.4        |
| Phenolic compound as C <sub>6</sub> H <sub>5</sub> OH | mg/l | 0.001        | <0.001     | <0.001     | <0.001     | <0.001     | <0.001     |
| Aluminium as Al                                       | mg/l | 0.03         | <0.02      | <0.02      | <0.02      | <0.02      | <0.02      |
| Arsenic as As                                         | mg/l | 0.05         | <0.005     | <0.005     | <0.005     | <0.005     | <0.005     |
| Boron as B                                            | mg/l | 1            | <0.1       | <0.1       | <0.1       | <0.1       | <0.1       |

## Surface Water Analysis Report

### Season: Winter

| Parameter                                             | Unit               | Standard     | SW1          | SW2          | SW3          | SW4          |
|-------------------------------------------------------|--------------------|--------------|--------------|--------------|--------------|--------------|
| pH                                                    | --                 | 6.5-8.5      | 6.9          | 6.7          | 7.3          | 6.75         |
| Colour                                                | --                 | Colourless   | Colourless   | Colourless   | Colourless   | Colourless   |
| Odour                                                 | --                 | Odourless    | Odourless    | Odourless    | Odourless    | Odourless    |
| Taste                                                 | --                 | Unobjectable | Unobjectable | Unobjectable | Unobjectable | Unobjectable |
| Total dissolved solids                                | mg/l               | 500          | 220          | 382          | 110          | 155          |
| Oil & Grease                                          | mg/l               | 10           | <0.1         | <0.1         | <0.1         | <0.1         |
| Chlorides as Cl.                                      | mg/l               | 250          | 20.0         | 72.0         | 50.0         | 20.0         |
| Sulphate as SO <sub>4</sub>                           | mg/l               | 400          | 10.0         | 19.0         | 10.0         | 15.0         |
| BOD 5days at 20° C                                    | mg/l               | 2.0          | 1.0          | 6.7          | 1.0          | 0.5          |
| Dissolved Oxygen                                      | mg/l (min)         | 6.0          | 5.0          | 3.5          | 5.0          | 4.0          |
| Iron as Fe                                            | mg/l               | 0.3          | 0.15         | 0.70         | 0.2          | 0.15         |
| Fluoride as F                                         | mg/l               | 0.6-1.2      | BDL          | BDL          | BDL          | BDL          |
| Arsenic as As                                         | mg/l               | 0.05         | <0.005       | <0.005       | <0.005       | <0.005       |
| Chromium as Cr <sup>+6</sup>                          | mg/l               | 0.05         | <0.001       | <0.001       | <0.001       | <0.001       |
| Copper as Cu                                          | mg/l               | 1.5          | <0.01        | <0.01        | <0.01        | <0.01        |
| Calcium as Ca                                         | mg/l               | 200          | 35           | 38           | 30           | 20           |
| Cadmium as Cd                                         | mg/l               | 0.01         | <0.005       | <0.005       | <0.005       | <0.005       |
| Zinc as Zn                                            | mg/l               | 15           | BDL          | BDL          | BDL          | BDL          |
| Selenium as Se                                        | mg/l               | 0.01         | <0.005       | <0.005       | <0.005       | <0.005       |
| Cyanide as CN                                         | mg/l               | 0.05         | <0.001       | <0.001       | <0.001       | <0.001       |
| Nitrate as NO <sub>3</sub>                            | mg/l               | 20           | 2.3          | 1.5          | 1.0          | 1.5          |
| Phenolic compound as C <sub>6</sub> H <sub>5</sub> OH | mg/l               | 0.002        | <0.001       | <0.001       | <0.001       | <0.001       |
| Coliform Organism                                     | No of Cells/ 100ml | 50           | 3.50         | 5.80         | 3.50         | 3.50         |

### 3.8 LAND ENVIRONMENT

The existing land environment status was studied with respect to the site location, topography, soil and land use.

#### 3.8.1 Regional Geology

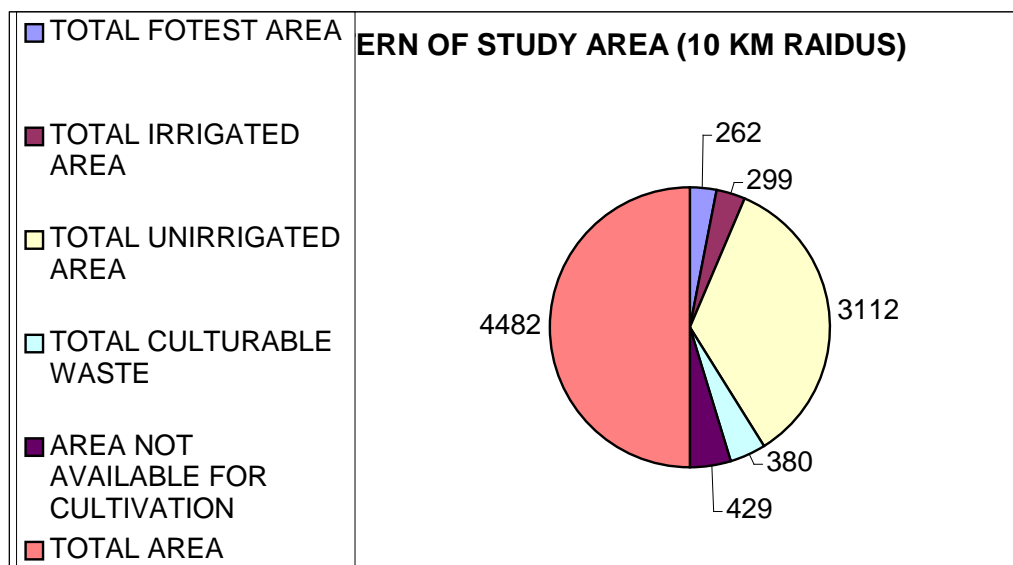
The Chhattisgarh region is almost coterminous with the purana sedimentaries and the Archaean granites and gneiss es exposed in the basin and the surrounding upland respectively. These flat to gentle dipping sedimentary beds rest on the Achaeen granities and gneisses. The basin boundary, at some places is formed by the metamorphosis rocks belong aging and at some place like the Tamnar series of the coal deposits between the overlaying beds and underlying Achaeen granites and gneisses.

### **3.8.2 Site Location and its topography**

The site is located in North direction from Kharsia Tehsil at Latitude 22 °06 '27 " N and Longitude 83 °07 '58 " E. Elevation of the site is 886 fts above MSL. The surrounding land covers mostly flat area. The River Mand flow in west direction. Mand River's shortest distance is observed at the boundary of study area i.e. 2.1 km.

### **3.8.3 Land Use**

A detailed land use pattern study has been carried out at macro level i.e. at tehsil level and 10 Km zone. The data was collected from Census Handbook and from records available at Tehsil Panchayat Office. The landuse pattern of the Study is as follows:



**Table 3.8**  
**Landuse Pattern In Study Area (Area In Hectares)**

| Name of village | House Hold | Forest (by Source) | Total Irrigated Area | Unirrigated Area | Culturable Waste | Area not available for cultivation |
|-----------------|------------|--------------------|----------------------|------------------|------------------|------------------------------------|
| Khedapali       | 149        | 39                 | 23                   | 391              | 37               | 49                                 |
| Banadhapali     | 124        | 47                 | 36                   | 414              | 21               | 28                                 |
| Edu             | 239        | 23                 | 11                   | 546              | 33               | 42                                 |
| Bojia           | 208        | 26                 | 22                   | 281              | 41               | 64                                 |
| Chhal           | 648        | 81                 | 28                   | 249              | 49               | 39                                 |
| Nawapara        | 409        | 17                 | 92                   | 528              | 93               | 81                                 |
| Chhirpan        | 186        | 0                  | 79                   | 381              | 77               | 110                                |
| Dehjari         | 119        | 29                 | 08                   | 322              | 29               | 16                                 |
| Total           | 2082       | 262                | 299                  | 3112             | 380              | 429                                |

### 3.8.4 Soil

The Chhattisgarh plains have the tropical Red and Yellow soils, developed in – situ alluvial soils, if any, are confined to eh flood plains

of large rivers. The parent rocks in Chhattisgarh are the shales and limestone as well as some sandstone in the plain areas while the upland contains mostly the granites and gneisses. The red colour that prevails in the soil is due to the diffusion of the iron in the parent rock. The process of soil formation in the Chhattisgarh plain is laterization. The coarseness and the low humus content is responsible for the low fertility of the soil. The tropical red and yellow soils or the red sandy soils of the region possess suitable textural conditions for growing rice and millet crops. It is because of the soil and a favorable hot – humid climate that the Chhattisgarh plains were once called the rice Bowl of Chhattisgarh, when it was the part of Chhattisgarh.

Four soil samples were collected from the study area for assessing the quality. The results of the soil quality of the area are given in **Table-3.11** and the sampling location is shown in **fig. 3.5 & Table – 3.10**

**Table – 3.9**  
**SOIL SAMPLING STATIONS**

| <b>STATION CODE</b> | <b>STATION</b> | <b>DISTANCE FROM THE PLANT (KM)</b> | <b>DIRECTION WRT PLANT SITE</b> |
|---------------------|----------------|-------------------------------------|---------------------------------|
| S-1                 | Khadapali      | 1.3 km                              | S                               |
| S-2                 | Edu            | 2.7 km                              | S                               |
| S-3                 | Chhal          | 2.7 km                              | NW                              |
| S-4                 | Nawapara       | 2.0 km                              | NE                              |



**Table-3.10**  
**SOIL QUALITY**

| Sl. No. | Parameters     | Units     | S <sub>1</sub> | S <sub>2</sub> | S <sub>3</sub> | S <sub>4</sub> |
|---------|----------------|-----------|----------------|----------------|----------------|----------------|
| 1       | pH             | ----      | 7.40           | 7.54           | 7.35           | 7.48           |
| 2       | E.C            | mohs/cm   | 111            | 103            | 102            | 110            |
| 3       | Sodium as Na   | ppm       | 39             | 34             | 45             | 46             |
| 4       | Bulk density   | gm/c.c    | 2.7            | 2.6            | 2.5            | 2.9            |
| 5       | Organic matter | %         | 0.4            | 0.4            | 0.3            | 0.4            |
| 6       | Chloride       | %         | 0.015          | 0.05           | 0.015          | 0.02           |
| 7       | Sand           | %         | 16             | 15             | 15             | 19             |
| 8       | Salt           | %         | 36             | 43             | 40             | 42             |
| 9       | Clay           | %         | 48             | 43             | 45             | 39             |
| 10      | Texture        | %         | Clayee         | Clayee         | Clayee         | Clayee         |
| 11      | Porosity       | %         | 46             | 45             | 43             | 42             |
| 12      | Water holding  | %         | 40             | 42             | 44             | 41             |
| 13      | C.E.C          | meq/100gm | 1.49           | 1.40           | 1.25           | 1.6            |
| 14      | Organic carbon | %         | 0.4            | 0.35           | 0.39           | 0.38           |
| 15      | N              | ppm       | 15             | 20             | 12             | 11             |
| 16      | P              | ppm       | 14             | 10             | 12             | 10             |
| 17      | K              | ppm       | 10             | 12             | 16             | 13             |
| 18      | S              |           | 8              | 9              | 10             | 8              |

- pH of the soil samples were found to be 7.35-7.54
- Nitrogen content of the soil samples were in the range of 11 to 20 mg/100gm
- Phosphorous content of the soil samples were in the range of 10 to 14 %
- Potassium content of the soil samples were in the range of 0.001 to 0.005 %
- Organic Matter content of the soil samples were in the range of 0.37 – 1.20%.

### **3.9 BIOLOGICAL ENVIRONMENT**

The project area and its surrounding contain both animals and plants whose survival rate is dependent on biotic structure and function of the system. Based on the type of distribution of organisms and its physical settings the study area can be classified in to two crop land, terrestrial and aquatic ecosystem. The numerical strength and multiformity of organisms constituting an ecosystem can change, modify or regulate the environment to a great extent. However degradation of the environment through human interference and the consequential climatic and edifice alternations would lead to loss or extinction of plan and animal species resulting in reduction in biodiversity. Thus ecosystem stability and environmental quality are mutually dependent. Since, each species has a definite role to play in the organisation and maintenance of the ecosystem, conservation of biodiversity and its stability is an important criterion in the establishment and maintenance of environmental quality. The benefits of any development project can be substantially reduced or even lost by excessive and / or irreversible damage to the local ecosystems. So ecological studies form an integral part of Environmental Impact Assessment and Environment Management Plan studies. Along with the physical environment, the ecology has also been studied as an integral part of the study of the present environmental status. These studies will also be a base to predict the likely impacts of the project so that appropriate mitigate measures can be taken.

Keeping the basic principle in mind the biological environment in and around the site has been studied. The vegetation in the region is scanty and wildlife of the study area is insignificant. Details of flora and fauna in the study area, as compiled from liter ature survey and data collected during field visit, are given in subsequent paragraphs. In order to understand the factors governing the system both abiotic

(physical setting) and biotic factors (Flora & Fauna) have been described.

The Flora and Fauna within the study area are mostly domestic. The present biological setting of the study area is by no means delicate or critical.

A field survey was carried out in the region which falls under Raigarh district. The existing flora and fauna of the region were surveyed with the objective of identifying certain pollution tolerant species for planting in a green belt around the industry. In addition a baseline survey of flora and fauna of the region was undertaken. Certain plants of importance have also been identified from the locally surveyed species.

### **Vegetation**

Native vegetation is reflection of the climate and the nature of the soils of the region; plants species of the Raigarh district have been identified.

As the study region has a hot dry climate, native vegetation is generally shrubby with few thorny scrub species showing certain Xerophytic conditions.

### **Flora**

Biological diversity of any region also serves as an indicator of the healthy status of the environment of the region. Flora and faunal elements of a region have got important bearing over economy and ecology of a region and also helps in the pollution control. Plant Species were found on site is listed blow:

**Table- 3.11**  
**LIST OF PLANTS FOUND IN THE STUDY AREA**

| <b>S. No.</b> | <b>Botanical Name</b>    | <b>Common Name</b> |
|---------------|--------------------------|--------------------|
| <b>A.</b>     |                          | <b>Trees</b>       |
| 1.            | Buchanania lanzan        | Achar              |
| 2.            | Mangifera indica         | Aam                |
| 3.            | Phyllanthus officinalis  | Amla               |
| 4.            | Terminalia belerica      | Bahera             |
| 5.            | T. chebula               | Harra              |
| 6.            | T. tomentosa             | Saj                |
| 7.            | Ficus bengalensis        | Bargad             |
| 8.            | F. religiosa             | Peepal             |
| 9.            | F. hispida               | Dumer              |
| 10.           | Kydia calycina           | Baranga            |
| 11.           | Aegela marmelos          | Bel                |
| 12.           | Zizyphus mauritiana      | Ber                |
| 13.           | Z. xylopyra              | Ghont              |
| 14.           | Semecarous anacardium    | Bhilwa             |
| 15.           | Pterocarpus marsupium    | Bija               |
| 16.           | Diospyros montana        | Bistendu           |
| 17.           | Diospyros melanoxylon    | Tendu              |
| 18.           | Grewia tiliaefolia       | Dhaman             |
| 19.           | Anogeissus latifolia     | Dhaura             |
| 20.           | Dalbergia paniculata     | Dhobin             |
| 21.           | D. shishoo               | Shisham            |
| 22.           | Writia tomentosa         | Dudhi              |
| 23.           | W. tinctoria             | Dudhi              |
| 24.           | Cleisanthus cellinus     | Gahraric           |
| 25.           | Chochlospermum religieum | Galagara           |
| 26.           | Adina cordifolia         | Haldu              |
| 27.           | Tamarindus indica        | Imli               |
| 28.           | Syzygium cumini          | Jamun              |
| 29.           | Nyctanthes arbotristis   | Harshringar        |
| 30.           | Milinsa tomentosa        | Kari               |
| 31.           | Dillenia pentagyna       | Kalakarmeta        |

|           |                          |               |
|-----------|--------------------------|---------------|
| 32.       | Bauhinia retusa          | Thawar        |
| 33.       | B. racemosa              | Phalesa       |
| 34.       | B. varigata              | Kachnar       |
| 35.       | B. urea                  | Keolari       |
| 36.       | Flaccurtia indica        | Kakai         |
| 37.       | Mitragyna parviflora     | Kalki         |
| 38.       | Stereospermum xylocarpum | Katori        |
| 39.       | Bridelia retusa          | Kasai         |
| 40.       | Garuga pinnata           | Kekad         |
| 41.       | Acacia tota              | -             |
| 42.       | A. catechu               | Khair         |
| 43.       | A. leucophloea           | -             |
| 44.       | Sterculia urens          | Kullu         |
| 45.       | Careya arborea           | Kumbhi        |
| 46.       | Schleichera oleosa       | Kusum         |
| 47.       | Ailanthus excelsa        | Maharukh      |
| 48.       | Madhuca indica           | Mahua         |
| 49.       | Randia dumetorum         | Manhar        |
| 50.       | Azadirachta indica       | Neem          |
| 51.       | Butea sps                | Palas         |
| 52.       | Soymida fabriguda        | Rohini        |
| 53.       | Tectona grandis          | Sagwan (Teak) |
| 54.       | Shorea robusta           | Sal           |
| 55.       | Boswellia serrata        | Salai         |
| 56.       | Mallotus philippensis    | Sindoori      |
| 57.       | Salamalia malabarica     | Semal         |
| 58.       | Euphorbia nivalia        | Thua          |
| 59.       | Wendlandia exserta       | Tilwan        |
| 60.       | Ougeinia oojeinensis     | Tinsa         |
| 61.       | -                        | Garud         |
| <b>B.</b> |                          | <b>Shrubs</b> |
| 1.        | Cissampelos pareira      | Gaypar        |
| 2.        | Cleome viscosa           |               |
| 3.        | Desmodium laxiflorum     |               |
| 4.        | Legerstroemia parviflora | Lendia        |
| 5.        | Vitex negundo            | Shivari       |
| 6.        | Phoenix humilis          | Pind khajur   |

|           |                            |                 |
|-----------|----------------------------|-----------------|
| 7.        | -                          | Gandhurwa       |
| 8.        | -                          | Kubbi           |
| <b>C.</b> |                            | <b>Herbs</b>    |
| 1.        | Abutilon indicum           | Kanghi          |
| 2.        | Corchorus capsulasis       | Cheya           |
| 3.        | Gotalaria albida           |                 |
| 4.        | C. calyaina                |                 |
| 5.        | C. spetabrilis             | Dhandhani       |
| 6.        | Indiogofera astragalina    |                 |
| 7.        | Vigna umbellata            |                 |
| 8.        | Cassia astragalina         |                 |
| 9.        | Vigna umbellata            |                 |
| 10.       | Cassia absus               |                 |
| 11.       | Ammania faccidera          |                 |
| 12.       | Mukia maderspatana         |                 |
| 13.       | Trachyspermum stictocarpum |                 |
| 14.       | Eclipta aiba               |                 |
| 15.       | Emilia sonchifolia         |                 |
| 16.       | Tridax procumbens          |                 |
| 17.       | Xanthium indicum           |                 |
| 18.       | Buchnera hispida           |                 |
| 19.       | Mecardonia procumbenrs     |                 |
| 20.       | Stiga asiatica             |                 |
| 21.       | Lavandula bipinnata        |                 |
| 22.       | Ocimum americanum          | Bantulsi        |
| 23.       | Alternanthera sessilis     | Guroo           |
| 24.       | Aclypha cilita             |                 |
| 25.       | Murdannia nudiflora        |                 |
| 26.       |                            | Cosmos          |
| 27.       |                            | Zinnia          |
| 28.       |                            | Dudhsi          |
| 29.       |                            | Chippa          |
| <b>D.</b> |                            | <b>Climbers</b> |
| 1.        | Atylosia scarbaeiodes      |                 |
| 2.        | Mucuna pruriens            | Kewanch         |
| 3.        | Trichosanthes cucumerina   |                 |
| 4.        | Ceropegia condelabrum      |                 |

|           |                         |                |
|-----------|-------------------------|----------------|
| 5.        | Smilax zeylanica        |                |
| 6.        | Bauhinia vahlii         |                |
| 7.        | Discorea sps.           |                |
| 8.        | Ventilago sps.          |                |
| <b>E.</b> |                         | <b>Grasses</b> |
| 1.        | Aristida setacea        | Bhend          |
| 2.        | Arumdinella sps         |                |
| 3.        | Dendrocalambs strictus  | Bans           |
| 4.        | Echinochloa colona      | Jheepa         |
| 5.        | Eragrostis tenella      | Bhurbhusii     |
| 6.        | Pennisetum pedicellatum | -              |
| 7.        | Tephrosia purpurea      | -              |
| 8.        |                         | Bhalukandi     |
| <b>F.</b> |                         | <b>Orchid</b>  |
| 1.        | Vanda sps.              | -              |

### Fauna:

The fauna found in the study area are snacks, a few hyenas and foxes. Domestic animals like cow, bullock, buffalo, and goats are common bred in the nearby villages. Bird species like Mynas, cr ow, sparrows, and eagles were also sighted. List of the fauna in the study area listed below:

**Table- 3.12**  
**FAUNA IN THE STUDY AREA**

| <b>Species</b>              | <b>English Name/<br/>Local Name</b> | <b>Distribution</b> |
|-----------------------------|-------------------------------------|---------------------|
| Herpestres<br>edwardsinyula | Common Moongoosa                    | Common              |
| Vulpes bengalensis          | India Fox                           | Rare                |
| Lapus nigricollis           | Indian Hare                         | Common              |
| Felis domisticus            | Cat                                 | Common              |
| Rousettus leschenaultia     | Fruit Bat                           | Common              |
| Bandicota indica            | Rat                                 | Common              |

|                           |                            |                          |
|---------------------------|----------------------------|--------------------------|
| Funumbuis palmarum        | Squirrel                   | Common                   |
| Mus ratus                 | Indian Rat                 | Common                   |
| Hystrix Indica            | Porcupine                  | Common                   |
| Mus musculus              | Common mouse               | Common                   |
| Milyus migrans            | Common kite                | Common near waste lands  |
| Quills contronix          | Grey quail                 | Common                   |
| Corvus                    | Jungle crow                | Rare                     |
| Corvus splendens          | Mouse crow                 | Common                   |
| Turdoides striatus        | White headed babler        | Common near paddy liekis |
| Pycnonotus cafer          | Red vented bulbul          | Common near hill region  |
| Pycnonotus jokokus        | White brewed bulbul        | Common                   |
| Saxicoloides fulicata     | Indian robin               | Common                   |
| Gallus gallus             | Red jungle fowl            | Rare                     |
| Columbus livibus          | Rock Pigeon                | Common, near waste land  |
| Bubo bubo                 | Indian great homed Owl     | Common, plantation       |
| Copsychus saularis        | Magpie Robin               | Common, plantation       |
| Tchitrea paradise         | Paradise Ft ycatcher       | Common, plantation       |
| Tephxodomis ondicerajanus | Common wood shrike         | Common, plantation       |
| Lalage sykesi             | Black headed cochoo shrike | Rare, plantatajons       |
| Artamus fuscus            | Ashy swallow shrike        | Rare                     |
| Dicruz-us macrocenn       | Black drongo               | Rare, plantations        |
| Dicrurus longicaudaws     | Grey drongo                | Rare, plantations        |



|                          |                            |                     |
|--------------------------|----------------------------|---------------------|
| Dissemurus paradiseus    | Rackete tailed drongo      | Rare, plantations   |
| Oriolus oriolus          | Indian Oriole              | Common, plantations |
| Oriolus xanthornus I     | Black I - leaded Oriole    | Rare                |
| Temenuchus pagodarurn    | Brahnuw Myna               | Common              |
| Acridotheres tristicus   | Common myna                | Common              |
| Ploceus Philippines      | Waver bird                 | Common              |
| Uroloncha strita         | Spotted munia              | Sparse, plantations |
| Passer domesticus        | House sparrow              | Common              |
| Redrumped swallow        | Hirundo daurica            | Sparse              |
| Motacilla cinerca        | Grey wagtail               | Sparse              |
| Cinnyrise lotonsis       | Lotens sunbird             | Srmrsc              |
| Cinnyris asia Uca        | Purple sunbird             | Sparse              |
| Brachyptemus bengalensis | Malabar golden backed wood | Common, plantations |
| Megalaima merulinus      | Indian cuckoo              | Common, plantations |
| Hierococys various       | Common hawk cuckoo         | Common, plantations |
| Eudynamis scolopaceus    | Koel                       | Rare, seasonal      |
| Centropus sinensis       | Crow pheasant              | Common              |
| Psittacula krammeri      | Rose tin ed arakeet        | Common              |
| Coryllis vacralis        | Lorikeet                   | Common              |
| Coracias benghapensis    | Indian Roller              | Sparse, plantations |
| Merops orientalis        | Common Bee Eater           | Common              |
| Merops ieschenaulti      | Chestnut headed bee eater  | Rare                |

### 3.10 SOCIO-ECONOMIC ENVIRONMENT

Socio economic environment includes description of de mography, available basic amenities like housing, health care services, transportation, education and cultural activities. Information on the above said factor has been collected to define the socio – economic profile of the study area (10 km radius)

The information on socio – economic aspects has been compiled from various secondary sources including various government and semi – government offices. Baseline information was collected from selected villages and the detailed scenario was collected from Taluk a and other governmental bodies. A brief summary of the same is given below:

#### **Archeological, Tourist, religious Site:**

Apart from there is no significant tourist center present with in study area.

#### **Amenities:**

Basic amenities like school, health care centers, drinking water, post and telegraphs, transport, road network, power supply communications are available at only a few villages. The others have to utilize these services from nearest village / town.

#### **Education:**

All the main villages have primary education facilities; however there is a need to promote secondary education facilities in these villages.

#### **Medical:**

Medical facilities in the region are poor residents have to travel around 4-5 kms for any health care facilities. The nearest facilities are at Chhal and Edu primary health centre and more problem at Kharsia or Dist place Raigarh Hospital.

#### **Drinking water:**

All the villages are provided with drinking water facilities either through wells, hand pump or protected water supply schemes.

**Post and Telegraph:**

Villages/ branch postal facilities are available in the villages and telecommunication are available with the help of WLL/land line/cell phone.

**Transport:**

Transport facilities are available to all the villages in the region.

**Power:**

Power facilities are available to all the villages in the study region.

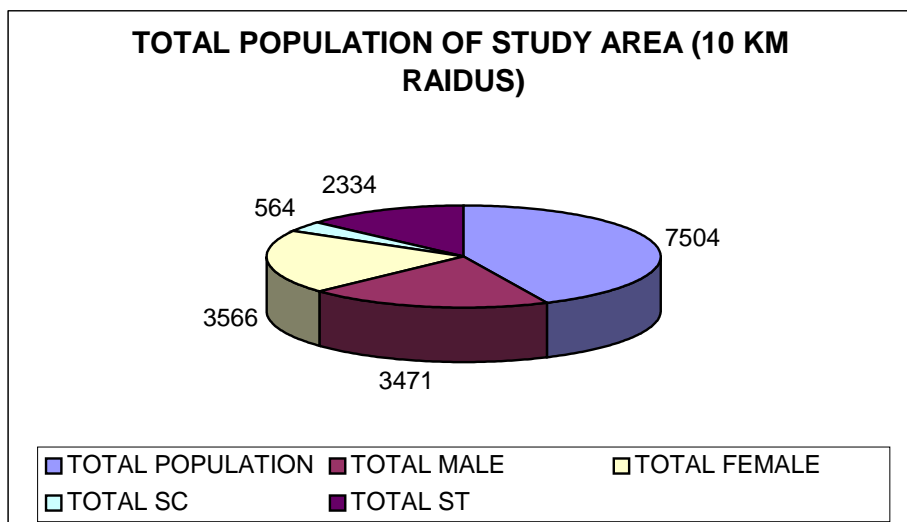
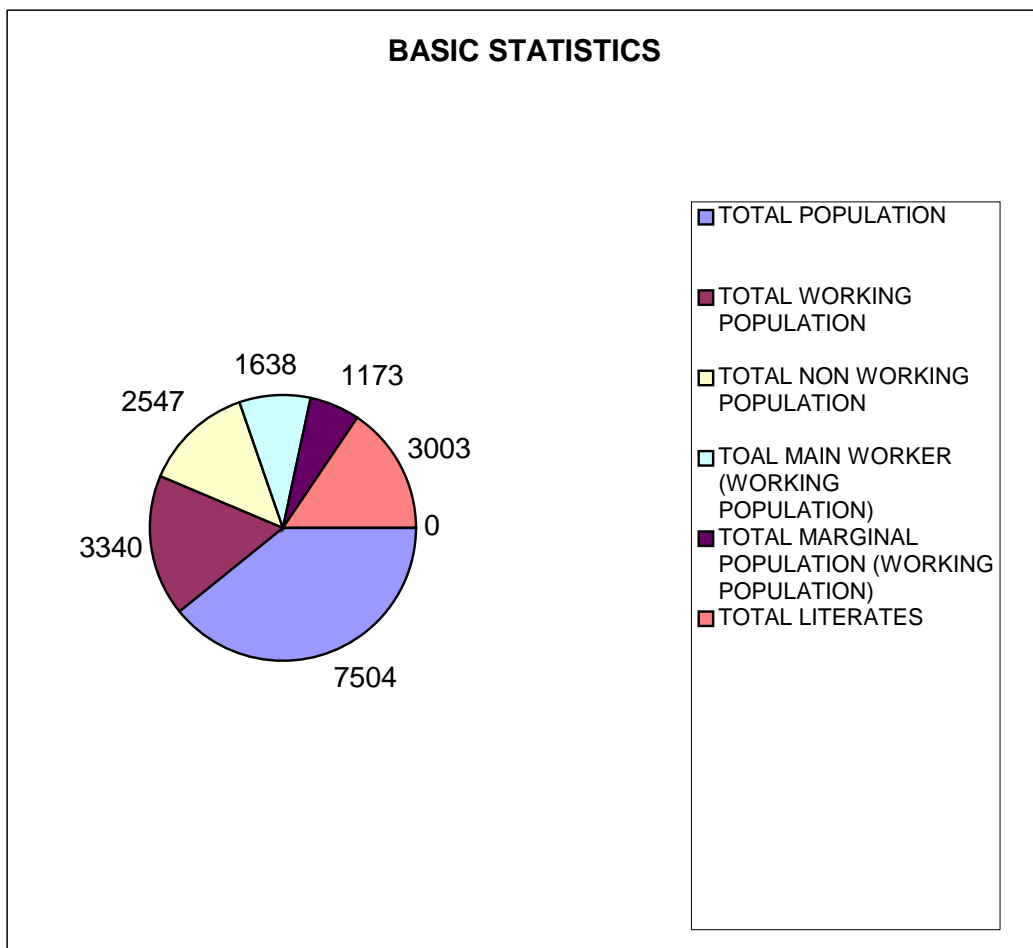
As per Census, the study area consist a total population of 26483. Percentage of the male and female are 49 and 51 respectively. Literacy rate of the area are approximately 62.95% respectively. 2702 (10%) population of the study area belongs to Schedule Caste and 7440 (28%) population of the study area belongs to Schedule Tribe. **Table 3.14, 3.15 and 3.16** gives the socio economic profile of the area.

**Table 3.13**

**ESTIMATED BASIC STATISTICS OF THE STUDY AREA**

|                   |        |
|-------------------|--------|
| 1. Households     | 5679   |
| 2. Population     | 26483  |
| Male              | 12906  |
| Female            | 13577  |
| 3. Schedule Cast  | 2702   |
| 4. Schedule Tribe | 7440   |
| 5. Literacy Rate  | 62.95% |

|                                                          |        |
|----------------------------------------------------------|--------|
| 6. Occupational Pattern:                                 |        |
| (A) Total Working Population (% of total population)     | 49.13% |
| (i) Cultivators (% of total working population)          | 19.61% |
| (ii) Agricultural Labors (% of total working population) | 23.45% |
| (iii) House Hold Labors (% of total working population)  | 0.63%  |
| (iv) Other Workers (% of total working population)       | 5.37%  |
| (1) Main workers (% of total working population)         | 62.06% |
| (2) Marginal Workers (% of total working population)     | 37.94% |
| (B) Total non working population (% of total population) | 50.87% |



**Table 3.14**

**VILLAGE WISE POPULATION WITHIN THE STUDY AREA**

| Name of village | Total Population | Total Population Males | Total Population Females | Total SC Population | Total ST Population |
|-----------------|------------------|------------------------|--------------------------|---------------------|---------------------|
| Khedapali       | 705              | 342                    | 329                      | 18                  | 129                 |
| Edu             | 1126             | 540                    | 586                      | 41                  | 450                 |
| Badhapali       | 543              | 264                    | 279                      | 16                  | 267                 |
| Bojia           | 911              | 383                    | 417                      | 76                  | 254                 |
| Chhal           | 1782             | 728                    | 719                      | 192                 | 361                 |
| Nawapara        | 938              | 487                    | 495                      | 81                  | 246                 |
| Chhirpan        | 941              | 459                    | 482                      | 77                  | 479                 |
| Dehjari         | 558              | 268                    | 259                      | 63                  | 148                 |

**Table 3.15**

**Socio-Economic structure of The Study area**

| Name of village | Total Population | Total Literates | Total Working Population | Total Main Workers | Total Marginal Workers | Total Non Workers | Sex Ratio | % of Agriculture | % of HHI |
|-----------------|------------------|-----------------|--------------------------|--------------------|------------------------|-------------------|-----------|------------------|----------|
| Khedapali       | 705              | 312             | 309                      | 284                | 82                     | 217               | 1061      | 36.7             | 0.3      |
| Edu             | 1126             | 528             | 625                      | 566                | 59                     | 501               | 1085      | 39.5             | 0.2      |
| Badhapali       | 543              | 295             | 296                      | 113                | 183                    | 247               | 1057      | 49.7             | 0.0      |
| Bojia           | 911              | 495             | 379                      | 239                | 160                    | 305               | 1165      | 25.1             | 0.0      |
| Chhal           | 1782             | 254             | 250                      | 120                | 130                    | 261               | 1044      | 62.8             | 0.0      |
| Nawapara        | 938              | 810             | 736                      | 460                | 276                    | 760               | 1038      | 43.2             | 3.5      |
| Chhirpan        | 941              | 210             | 416                      | 202                | 174                    | 27                | 1092      | 37.4             | 0.3      |
| Dehjari         | 558              | 309             | 329                      | 220                | 109                    | 229               | 1154      | 43.0             | 0.6      |
| Total           | 7504             | 3003            | 3340                     | 1638               | 1173                   | 2547              | 1087      | 42.17            | -        |

**Table 3.16**  
**AMINITIES AVAILABLE IN STUDY AREA**

| Name of village | Educational facilities | Primary School | Middle School | Secondary School | Senior Secondary School | Collage | Medical facilities |
|-----------------|------------------------|----------------|---------------|------------------|-------------------------|---------|--------------------|
| Khedapali       | 1                      | 1              | 1             | 1                | 0                       | 0       | 2                  |
| Bandhapali      | 1                      | 1              | 1             | 1                | 0                       | 0       | 1                  |
| Edu             | 1                      | 1              | 1             | 0                | 0                       | 0       | 2                  |
| Chhal           | 1                      | 1              | 0             | 0                | 0                       | 0       | 2                  |
| Bojia           | 1                      | 1              | 0             | 0                | 0                       | 0       | 2                  |
| Nawapara        | 1                      | 2              | 1             | 1                | 0                       | 0       | 1                  |
| Dehjari         | 1                      | 1              | 1             | 0                | 0                       | 0       | 2                  |
| Chhirpan        | 1                      | 1              | 0             | 0                | 0                       | 0       | 2                  |

**Table 3.17**  
**AMINITIES AVAILABLE IN STUDY AREA**

| Name of village | Health Center | Drinking water | Tap Water | Well Water | Tank Water | Tubewell Water |
|-----------------|---------------|----------------|-----------|------------|------------|----------------|
| Khedapali       | 0             | 2              | 0         | 1          | 1          | 2              |
| Bandhapali      | 0             | 1              | 0         | 1          | 0          | 2              |
| Edu             | 1             | 1              | 0         | 1          | 0          | 7              |
| Chhal           | 1             | 3              | 2         | 1          | 1          | 6              |
| Bojia           | 0             | 1              | 0         | 1          | 0          | 2              |
| Nawapara        | 0             | 1              | 0         | 1          | 0          | 1              |
| Dehjari         | 0             | 1              | 0         | 1          | 0          | 0              |
| Chhirpan        | 0             | 1              | 0         | 1          | 0          | 0              |

## Chapter Four

# Identification & Prediction of Impacts



# Chapter 4

# Identification and Prediction of Impact

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## 4.1 INTRODUCTION

Prediction of impacts is the process of determining the nature and extent of the environmental changes that may result from proposed activity. The predicted values for environmental variables from the objective basis for the assessment of the environmental feasibility of the proposed activity and for evaluation of the effectiveness of mitigating measures.

Many well designed scientific techniques and methodologies are available to predict impact on physico-ecological environment. Techniques based on mathematical model and environmental monitoring for establishing the impact on various environmental components after commissioning of the proposed plant, techniques were used to device quantitatively the cause and effect relationship between source of pollution and different environmental components. Prediction of impacts for the proposed projects were carried out for environmental components like air, water, land, socio-economic, etc.

The management of M/s Jayem Coal Benefication and Power Pvt. Limited has decided to carry out REIA study the existing pre-Project status of the environment and to study the impact on the surroundings due to the proposed project. The study was conducted by setting up field stations for measurement of ambient air quality, analysis of water and soil, collecting demographical and other relevant data as stated in Chapter-3. Based on the observations of the field study an environmental management plan was suggested to minimize any adverse impact on the environment and the same is presented in Chapter - 6.

#### **4.2 PREDICTION OF IMPACT ON THE AIR ENVIRONMENT**

Prediction of impact of the proposed 0.96 Million Tons per annum coal benefication on ambient air quality was carried out using Gaussian Plume Dispersion Models.

Emission from Jayem Coal Benefication and Power Pvt. Limited Project operations will be mostly fugitive in nature and moderate in quantity. The most important factor affecting project emissions are raw material composition, unit operations like screening, air pollution control equipments used, general level of maintenance, products and production scheme used, material handling and transportation etc. Since stack will not be there, so there would be no stack base emission. Emission from proposed project would be from coal unloading, feeding hopper, conveyor, air vent. However, proper air vent will be installed to provide clean gas path after de-dusting system. However, predicted GLC of SPM emission from the proposed units may be used for the planning/installation of pollution control measures in the unit.

The short term peaks (1hr. average) of SPM due to the proposed plants for the critical meteorological characteristics and distance of occurrence of maximum impacts on ambient air quality from respective sources after air pollution control systems are mentioned herewith. It is pertinent to point out here cumulative short term peaks (MGLC) of SPM  $2.19 \mu\text{g}/\text{m}^3$  under unstable atmospheric conditions (stability class A) and wind speed of 2.0 m/s.

The results of model present in the graphs indicate that the impact on ambient air quality will be maximum within 0.6 Km downwind under unstable conditions (stability class A) and more than 5.0 Km under stable conditions (stability class F).

The results of the simulation shown in table proves that the incremental SPM concentration at all receptors over the area are insignificant and are very low as compared to the standards prescribed by the CPCB for ambient air quality. Thus, it can be safely stated that due to the proposed plant there will be no adverse impact on the existing ambient air quality. Due to proposed coal beneficiation plant.

#### **4.3 PREDICTION OF IMPACT ON THE WATER ENVIRONMENT**

As stated chapter-2, the total quantity of water will be required per day for proposed project would be about  $125 \text{ m}^3/\text{day}$ . Out of  $125 \text{ KL}/\text{day}$ ,  $85 \text{ KL}/\text{day}$  will be used for dust suppression and coal beneficiation. This water will be re-circulated and there will be only evaporation losses. Discharge of domestic wastewater will be about  $05 \text{ m}^3/\text{day}$ , which shall be treated through the septic tank and soak pit arrangement. Thus there will be no adverse impact over the water environment.

#### **4.4 PREDICTION OF IMPACTS ON LAND ENVIRONMENT**

As proposed, coal washery of M/s Jayem Coal Benefication and Power Pvt. Limited will be installed on barren land near to village Khedapali, in the dist of Raigarh, hence, there will be no change in land use and disturbance of soil. Then wet ash will be discharged to trucks for disposal. It is proposed to store coal reject for three days in silos inside premises. We will not store coal reject in open area in any circumstance.

Thus land environment will not be adversely affected. Total land is about 8.23 acres and proposed plantation area minimum 34 % will provide good aesthetic value at later stage.

#### **4.5 PREDICTION OF IMPACT ON THE SOCIO-ECONOMIC ENVIRONMENT**

The impacts of the project would be felt in an integrated manner on the socio-economic environment in the study area. The impacts on the different components viz employment, housing, educational, and medical and transport facilities, fuel availability, economics, status, health agriculture is moderately significant. Though size of project is small, but it will generate direct and indirect employment in the area. Main aim behind installation of 0.96 MTPA coal beneficiation project is to meet out fuel requirement of power plant located on orrisa road Raigarh and serve good quality coal to various sponge iron project requirement of the area. To meet out such requirement there might be adverse impacts in the surrounding area, but while considering over all impact it would be beneficial.

#### **4.6 NOISE ENVIRONMENT**

Considering the ambient Noise level monitoring in and around an area reflects that at locations near to the area, noise levels are within the standards prescribed. The working environment in the plants shall satisfy the standards prescribed by OSHA. The workers involved in operations will be provided with earmuffs/ earplugs. All the noise generating equipments shall be provided noise shield and enclosures as per the requirement. Thus it can be concluded that the noise environment of the area does not reach to an objectionable level and adverse effect of activity over noise environment of the area is low.

#### **4.7 BIOLOGICAL ENVIRONMENT**

The biological environment mainly consists of flora and fauna and its relationship with surroundings. Biological environment includes species of native plants and animals and one may measure the degradation of environment by noting the decrease in the commonly occurring species.

There is a reserve forest located in the nearby area of the proposed plant. The land is devoid of any forest and shrubs and bushes can be seen in the area. Moreover, there are no known rare, endangered species in this region. Hence, there will be no considerable impact on the biological environment. The massive afforestation planned for the project shall generate a forest having greater tree density. The proposed extensive will enhance the vegetation quality as well as aesthetic quality of the area. Thus there is no adverse impact envisaged over biological environment due to the proposed project.

### OVERALL IMPACT

|                                          | ATTRIBUTES                      | EXPECTED IMPACT ON ENVIRONMENT                                                                                         |
|------------------------------------------|---------------------------------|------------------------------------------------------------------------------------------------------------------------|
| <b>A. IMPACT ON PHYSICAL ENVIRONMENT</b> |                                 |                                                                                                                        |
| 1.                                       | Meteorology                     | No impact                                                                                                              |
| 2.                                       | Air Quality                     | Slight adverse impact. As proper EMP shall be followed, so there will not be significant impact.                       |
| 3.                                       | Ground Water                    | No significant impact, as rain water harvesting is proposed to protect the ground water table.                         |
| 4.                                       | Topography & Geology            | No significant impact.                                                                                                 |
| 5.                                       | Soil                            | Soil quality of the site improved due to Green Belt development.                                                       |
| 6.                                       | Emission Sources                | No significant impact as proper dedusting system of 50 mg/M <sup>3</sup> max. is proposed.                             |
| <b>B. IMPACT ON ECOLOGY</b>              |                                 |                                                                                                                        |
| 1.                                       | Fresh Water                     | No impact                                                                                                              |
| 2.                                       | Flora & Fauna                   | There will different Sp. Planted in the plant premises and which will throw Positive sign towards healthy environment. |
| 3.                                       | Forestry                        | No impact                                                                                                              |
| <b>C. HUMAN USE ASPECT</b>               |                                 |                                                                                                                        |
| 1.                                       | Land use                        | Positive impact due to green belt development.                                                                         |
| 2.                                       | Transportation                  | Positive impact due to transportation of persons, raw materials.                                                       |
| 3.                                       | Water Supply                    | No impact.                                                                                                             |
| 4.                                       | Power Supply                    | Positive impact                                                                                                        |
| 5.                                       | Medical facilities              | Positive impact due to health cares facilities for workers & villages.                                                 |
| 6.                                       | Industries and other facilities | Positive impact for industrial development.                                                                            |

|                                   |                                |                                                                               |
|-----------------------------------|--------------------------------|-------------------------------------------------------------------------------|
| 7.                                | Fisheries and Animal Husbandry | No impact.                                                                    |
| 8.                                | Housing                        | No impact                                                                     |
| 9.                                | Visual Landscape               | Positive impact due to barren land converted into a shape and beautified.     |
| <b>D. IMPACT ON SOCIO-ECONOMY</b> |                                |                                                                               |
| 1.                                | Economic aspects               | Positive impact in respect of employment                                      |
| 2.                                | Cultural and religious         | Positive impacts since the employees are from different culture and religion. |
| 3.                                | Gross economic product         | Positive impact due to change in national and zonal economy.                  |

### AIR VENT EMISSION CHARACTERISTICS

#### Jayem Coal Benefication and Power (P) Limited

| S. No. | Name of Unit (with control equipment (CE)) | Air Vent height (m) | Air Vent top dia. m | Air Vent temp. (K) | Air Vent velocity (m <sup>3</sup> /hr) | Air Vent Emission Rate (mg/NM <sup>3</sup> ) SPM |
|--------|--------------------------------------------|---------------------|---------------------|--------------------|----------------------------------------|--------------------------------------------------|
| 1      | De Dusting System                          | 30                  | 0.35                | ambient            | 40,000                                 | 50                                               |

## Chapter Five

# Evaluation of Impacts



# Chapter 5

# Evaluation of Impact

---

## 5.1 INTRODUCTION

The management of M/s Jayem Coal Benefication and Power Pvt. Limited appointed M/s The Care, Raipur to carry out a Rapid Environmental Impact Assessment study for the proposed 0.96 MTPA coal beneficiation project. The aim of the study is to assess the impact on the surrounding environment due to the proposed project. The study was conducted by setting up field stations for measurement of ambient air quality, analysis of water and soil, collecting demographical and other relevant data as stated in Chapter – 3. Based on the observation of the field study an environment management plan was suggested to minimize any adverse impact on the environment and it is presented in Chapter – 6.

## 5.2 BATTELLE ENVIRONMENTAL EVALUATION SYSTEM

Battelle Environmental Evaluation System (BEES) has been used for evaluation of impacts arising out of the project activities. The application of BEES involves the identification of environmental parameters likely to be affected by the project implementation and estimation of the resulting change in environmental quality by aggregation of changes in the selected parameters.

Further, as each of the selected parameter represents only a part of the total environment, weights are assigned to the parameters to reflect their relative importance towards the impact of the project on

the natural environment and are expressed as parameters importance units (PIUs). A total of 1000 PIUs are allocated amongst the selected parameters. BEES, also necessitates transformation of the parameters a estimates into Environment Quality (EQ) on a scale ranging from zero to one. Such transformation is achieves through value function curves, which provide a functional relationship between the two.

For evaluation of the impact of the project on the surrounding environment, an index expressed as Environmental Impact Unit (EIU) is calculated for three alternative environment conditions, namely, (A) the baseline (B) predicted without Environment Management Plan (EMP) and (c) predicted with EMP. The EIU, defined as the summation of the product of EQ and PIU for individual parameters for these conditions is obtained as follows :

$$EIU = \sum_{i=1}^n (EQ)_{ij} (PIU)_i$$

Where,

EIU = Index value for jth environmental condition

n = Number of parameters considered for impact evaluation

EQ<sub>ij</sub> = Environmental quality for ith parameter and jth environmental condition

PIU<sub>i</sub> = Parameter importance units for ith parameter

The inference about the impact of proposed project activities is dr awn based on the extent of positive or negative change in EIU due to the project (with EMP) from the baseline condition (C -A) and the efficacy of the Environmental Management Plan.

EMP is also judged by comparing the change in EIU with and without EMP (C-B).

### 5.3 Environmental Impact Assessment

Environmental quality assessment of M/s Jayem Coal Benefication and Power Pvt. Limited for proposed project is undertaken by evaluating 53 relevant environmental parameters. These 53 parameters represent the various components of environment viz., biological environment, environmental pollution incorporating, water, air, land and noise pollution, aesthetics and human interests.

Functional relationship (value function graphs) have been developed for each of the selected parameter, relating parameter measurement with environmental quality.

The allocation of PIUs, among the selected environmental parameters represents a consequent of opinion of members of an interdisciplinary team of experts. Accordingly, the major environmental categories' i.e. biological environment, environmental pollution, aesthetics and human interests are allocated 300, 450, 100, 150 PIUs respectively, out of a total 1000 units.

Evaluations of impacts for 4 categories based on the above allocation are presented in Table 5.1 to 5.4. Summary of environmental evaluation is given in Table 5.5.

## **5.4 Environment Pollution**

### **a) Water Environment**

Baseline ground quality is meeting the drinking water quality standards. Due to operation of plant no negative impacts on ground water are anticipated, as there will be proper and 100 % recycle treatment base industrial wastewater generated from the plant. Domestic waste will be treated prior to disposal through septic tank and soak pit arrangement. However, follow-up of EMP, any adverse impacts would be further minimized. For separation and precipitation of suspended particles mainly part of coal coming along with water stream will be executed effectively. From clarifier water will again be recycled in the process leaving suspended particles of water stream.

### **b) Air Environment**

During construction of the project and other infrastructure facilities, and increased movements of vehicles, the level of suspended particulate matter is likely to go high causing slight deterioration in the ambient air quality. During REIA study background SPM level varies from 106.3 – 148.1  $\mu\text{g}/\text{m}^3$ . This high background level is mainly due to local disturbances like lifting of dust from agricultural activities, vehicular traffic etc. Release of dust from the proposed project would contribute a maximum of 2.19  $\mu\text{g}/\text{m}^3$  in worst condition i.e. class "A" to this background level as Bag Filter of 50 mg/cum is proposed with the air vent. No significant  $\text{SO}_2$  and  $\text{NO}_x$  contributions from the washery are expected and also it is emphasized that air vent height are designed by taking consideration of SPM emission as per CPCB norms.

**c) Land Environment**

Landuse pattern of the study area mainly comprise of agricultural land and non-cultivable land. Forest is seen observed in the study area. Soil texture and soil chemistry would anticipate adverse impacts. However with the development of green belt, the minimal adverse impacts would also be minimized (Table 5.2).

**d) Noise Environment**

Increased vehicular movements and construction activities may result in adverse effect on noise environment. Green belt development will result in arresting the noise. Occupational noise exposure would increase but adverse impacts will be reduced by provision of noise protection device.

**e) Aesthetic Environment**

The topography of the area generally slight plain terrain with gentle undulation here and there. Although, Jayem Coal Benefication and Power Pvt. Limited has plan to convert the surrounding area into a beautiful garden, and lush green belt i.e. 34 % of total area. Presently this 34 % is totally barren. Though construction activities may produce adverse impacts on aesthetic environment, further development of green belt as suggested in EMP may restore the aesthetic environment.

**f) Human Interest**

The construction and operation activities will create some new employment at local as regional level. With provision of various infrastructure facilities, the positive impacts on these socio-economic parameters are anticipated.

### **g) Biological environment**

The impacts on biological parameters are presented in Table 5.1. Natural vegetation in 10 km radius areas is not considerable (8.7% forest and 71.3% agriculture). There are no rare and endangered plant or animal species within 10 Km zone. Hence no impact on these parameters is envisaged. With the construction of the project, there will be some adverse impacts on terrestrial biological parameters. However, with the development of the green belt these adverse impacts would be minimised.

## **5.5 Overall Impact Evaluation**

A summary of the impacts on environmental parameters is presented in Table 5.5. The table presents quantitative evaluation of the existing/baseline environment status as well as anticipated changes brought out by the project under two scenarios namely, with or without EMP. The net environmental changes, arising out of the project implementation are positive with the follow up of EMP.

## **5.6 ENVIRONMENTAL IMPACT STATEMENT**

The environmental impacts related to the proposed project have been studied for both the construction and operation phases and the assessment for each of the phases is discussed below:

### **5.6.1 Construction Phase**

The impact of the construction phase on the environment have been studied in depth and the conclusions are as follows:

- (i) The proposed plant is to be installed on the barren land, which has been purchased by the project proponent near

to village Khedapali, block Kharsia in Dist Raigarh (CG). The site is on leveled ground and therefore does not require much of leveling work. However down portion will be used in hopper part of equipment. So that civil and erection cost would be minimise. Hence much dust will not be generated during construction work of this project.

- (ii) There are no temporary structures existing on the proposed site. The proposed location is devoid of any tree plantation. Hence no ecological impact is envisaged during the construction of the project.
- (iii) Local labour will be employed for construction and hence no inward migration is expected.
- (iv) Also there will not be wastewater discharges during construction and hence no water related impact is envisaged during construction of the project. The wastewater from washing activity will be given treatment through soak pit arrangement.
- (v) Other infrastructure facilities like roads for bringing construction equipments / materials etc. already exist outside the premises; hence no new roads will be needed specifically for this project.

In brief, the construction activity of the proposed project will not have any adverse environmental impact, on the surroundings.

### **5.6.2 Operation Phase**

The impact statement focuses on the study area of 10 Km radiuses around the proposed site. The five basic environmental components likely to get affected are:

- Air Environment

- Noise Environment
- Water Environment
- Land Environment
- Socio-economic environment

For all the environmental parameters impact identification, measurement, prediction of data and finally evaluation have been done using BEES to arrive at the complete scenario of adverse or beneficial impacts.

#### **5.6.2.1 Air Environment**

Meteorological data collected for last few years from IMD and also at site reflects the general trend of the climate of the study area. For the short term concentration study emission data provided by Jayem Coal Benefication and Power Pvt. Limited were used along with meteorological data collected seasonally (one seasons) over a period of three months by setting up field station near the site. EMP measures have been proposed to mitigate long term as well as short - term impact, so that general air pollution is brought down. As discussed in this Chapter predicting the short -term averages of SPM for various scenarios carried out the mathematical modeling study.

As a result of pollution abatement measures (outlined in Chapter -3) to be adopted, the overall emissions from manufacturing will be less than 50 mg/Nm<sup>3</sup>. The present air quality with respect to suspended particulate matter varies between 106.3 – 148.1 µg/m<sup>3</sup>. This high concentration is due to presence of vehicular activity, wind blown dust condition etc. The resultant (GLC) air quality after the emission dispersion will be insignificant to alter the already high ambient levels



of SPM. Hence it is concluded that the air pollution impact on environment will not be adverse.

As stated earlier in order to predict and assess the impact of this project on existing ambient air quality. A programme on computer for short-term concentration was run for 8 PM based on the Gaussian diffusion model and on the emission data provided by Jayem Coal Benefication and Power Pvt. Limited for their proposed Project.

The existing ambient air quality ranges between 106.3 – 148.1  $\mu\text{g}/\text{m}^3$ . From the dispersion modeling results it is seen that the maximum concentration of 2.19  $\mu\text{g}/\text{m}^3$  occurred at 0.4 km from source center in summer season.

The background status  $\text{SO}_2$  and  $\text{NO}_x$  are between 6.2 to 22.9  $\mu\text{g}/\text{m}^3$  and 5.9 to 20.6  $\mu\text{g}/\text{m}^3$  respectively. However, stacks height is designed by taken into consideration of  $\text{SO}_2$  emission, which will take care of  $\text{SO}_2$  dispersion. This proves that the emissions from the proposed project are insignificant and will not adversely affect the existing ambient air quality.

#### **5.6.2.2 Noise Environment**

Noise impact due to proposed project can sometimes be significant for the workers working in certain process zones if exposed for larger duration and therefore, mitigation measures suggested for the workers protection should be adopted.

Noise impacts due to Jayem Coal Benefication and Power Pvt. Limited on surrounding population are between 50-55 dBA and noise levels within plant boundary are within stipulated limit of <85 dBA (OSHA).

The proposed project is likely to contribute to the existing noise levels: however the proposed green belt shall help attenuating the noise.

Noise levels in nearby villages and settlements near roads are some times high because of traffic on major roads and noise generated from social/religious functions and therefore, do not need any special attention.

### **5.6.2.3 Water Environment**

There will be generation industrial effluent due to proposed projects. Which would be effectively treated in well designed ETP. Then it would be made available for reuse back to process. Evaporation losses will be made up by treated water. The domestic wastewater generated from the proposed plant will be treated in well-designed septic tank followed by soak pit arrangement. The blow down from the clarifier section which is about 3 cum per day will be precipitated for separation of suspended solids in settler and mixed with clarifier stream. Thus the effluent would get finally dispersed into the soil and no further treatment would be necessary. It is thus presented that instead of any additional negative impact on water quality; there will be a positive impact in the water table due to water harvesting techniques.

Hence it can be safely stated that the proposed project will have no adverse effect on the ground water and soil quality.

#### **5.6.2.4 Land Environment**

The soil and agriculture can be affected by Gaseous Emission, wastewater discharge or solid waste disposal. The ground level concentration (GLC) of SPM will be very low as proved by the mathematical modeling. As stated above the domestic wastewater will be rendered harmless and disposed off by percolation into the soil by soak pits. Noise abatement method to be followed no adverse impact on human health due to noise is envisaged.

Further, as a result of the proposed project, a considerable socio - economic development in this district of Raigarh bound to take place. Together with practically no adverse environment and ecology impact, the region around the plant will be benefited and economic prosperity will be the outcome.

#### **(i) Social Benefits**

As indicated earlier, the project is being put up in a backward area. As such, the project will not only help in the development of the area, but will also generate direct and indirect employment around the area. The project will uplift the standard of living of people.

On implementation, the project would be in a position to partially meet the increasing demand of power of northern astern states of the country.

#### **(ii) Employment Potential**

This project will generate direct employment for number of people as well as indirect employment to many more due to development of various ancillaries in the adjoining areas on implementation.

### **(iii) Accruals to the Exchequer**

The project will contribute additional revenue to the Central Exchequer in the form of excise duty. It will also bring to the State Exchequer additional money by way of Sales Tax, etc.

## **5.7 CONCLUSIONS**

Due to the high standard, of mitigation measures to be adopted and from the assessment of various impacts it can be safely stated that the proposed project of M/s **Jayem Coal Benefication and Power Pvt. Limited** will be ecologically and environmentally compatible to the site. Most of the developed countries have manufacturing plants in populated areas with no adverse effect in the surrounding.

Table 5.1  
Environmental Evaluation of  
Jayem Coal Benefication and Power Pvt. Limited  
**Biological Environment**

| <b>Parameters</b>             | <b>Weight PIU</b> | <b>Baseline EIU (a)</b> | <b>Without EMP EIU (b)</b> | <b>With EMP EIU (c)</b> | <b>Change With out EMP EIU (c-a)</b> | <b>Change With EMP EIU (c-b)</b> |
|-------------------------------|-------------------|-------------------------|----------------------------|-------------------------|--------------------------------------|----------------------------------|
| Terrestrial                   |                   |                         |                            |                         |                                      |                                  |
| Natural Vegetation            | 35                | 16                      | 10                         | 19                      | +3                                   | +9                               |
| Species Diversity             | 25                | 12                      | 8                          | 13                      | +1                                   | +5                               |
| Crops                         | 25                | 15                      | 13                         | 14                      | -1                                   | +1                               |
| Food web Index                | 25                | 14                      | 14                         | 14                      | 0                                    | 0                                |
| Animal species                | 15                | 15                      | 15                         | 15                      | 0                                    | 0                                |
| Rare Endangered plant Species | 15                | 15                      | 15                         | 15                      | 0                                    | 0                                |
| Pest species                  | 10                | 10                      | 10                         | 10                      | 0                                    | 0                                |
| Soil Microbiology             | 10                | 7                       | 6                          | 7                       | 0                                    | +1                               |
| Total                         | 160               | 104                     | 91                         | 107                     | 3                                    | 16                               |
| Eutrophication                | 25                | 21                      | 21                         | 21                      | 0                                    | 0                                |
| Natural Vegetation            | 25                | 12                      | 12                         | 12                      | 0                                    | 0                                |
| Commercial Fisheries          | 20                | 8                       | 8                          | 8                       | 0                                    | 0                                |
| Species Diversity             | 15                | 7                       | 7                          | 7                       | 0                                    | 0                                |
| Food Web Index                | 15                | 8                       | 8                          | 8                       | 0                                    | 0                                |
| Rare & Endangered Species     | 15                | 15                      | 15                         | 15                      | 0                                    | 0                                |
| River Water                   | 15                | 9                       | 9                          | 9                       | 0                                    | 0                                |
| Pest Species                  | 10                | 10                      | 10                         | 10                      | 0                                    | 0                                |
| Total                         | 140               | 90                      | 90                         | 90                      | 0                                    | 0                                |
| Grand Total                   | 300               | 194                     | 181                        | 197                     | 3                                    | 16                               |

**Table 5.2**  
Environmental Evaluation of  
Jayem Coal Benefication and Power Pvt. Limited  
**Environmental Pollution**

| <b>Parameters</b>      | <b>Weight PIU</b> | <b>Baseline EIU (a)</b> | <b>Without EMP EIU (b)</b> | <b>With EMP EIU (c)</b> | <b>Change With out EMP EIU (c-a)</b> | <b>Change With EMP EIU (c-b)</b> |
|------------------------|-------------------|-------------------------|----------------------------|-------------------------|--------------------------------------|----------------------------------|
| <b>Water</b>           |                   |                         |                            |                         |                                      |                                  |
| BOD                    | 30                | 25                      | 25                         | 26                      | 1                                    | 1                                |
| DO                     | 30                | 25                      | 25                         | 26                      | 1                                    | 1                                |
| TS                     | 20                | 18                      | 14                         | 16                      | -2                                   | 2                                |
| Turbidity              | 20                | 18                      | 14                         | 15                      | -3                                   | 1                                |
| Oil & Grease           | 20                | 18                      | 18                         | 18                      | 0                                    | 0                                |
| Toxic Substance        | 15                | 15                      | 15                         | 15                      | 0                                    | 0                                |
| Faecal Coliform        | 10                | 8                       | 7                          | 8                       | 0                                    | 1                                |
| pH                     | 10                | 8                       | 7                          | 8                       | 0                                    | 1                                |
| Temperature            | 10                | 10                      | 10                         | 10                      | 0                                    | 0                                |
| Nutrients              | 10                | 7                       | 7                          | 7                       | 0                                    | 0                                |
| <b>Total</b>           | <b>175</b>        | <b>152</b>              | <b>142</b>                 | <b>149</b>              | <b>-3</b>                            | <b>7</b>                         |
| <b>Air</b>             |                   |                         |                            |                         |                                      |                                  |
| SPM                    | 105               | 50                      | 33                         | 41                      | -9                                   | 8                                |
| SO <sub>2</sub>        | 35                | 30                      | 28                         | 28                      | -2                                   | 0                                |
| NO <sub>x</sub>        | 20                | 20                      | 18                         | 18                      | -2                                   | 0                                |
| CO                     | 15                | 15                      | 12                         | 12                      | -3                                   | 0                                |
| <b>Total</b>           | <b>175</b>        | <b>115</b>              | <b>91</b>                  | <b>99</b>               | <b>-16</b>                           | <b>8</b>                         |
| <b>Land</b>            |                   |                         |                            |                         |                                      |                                  |
| Soil fertility         | 20                | 13                      | 10                         | 13                      | 0                                    | 2                                |
| Landuse Pattern        | 20                | 14                      | 12                         | 15                      | 1                                    | 3                                |
| Soil Chemistry         | 10                | 8                       | 6                          | 8                       | 0                                    | 2                                |
| Soil Erosion           | 10                | 6                       | 7                          | 9                       | 3                                    | 2                                |
| <b>Total</b>           | <b>60</b>         | <b>41</b>               | <b>35</b>                  | <b>45</b>               | <b>4</b>                             | <b>10</b>                        |
| <b>Noise Pollution</b> |                   |                         |                            |                         |                                      |                                  |
| Community Noise        | 20                | 16                      | 13                         | 15                      | -1                                   | 2                                |
| Occupational Noise     | 20                | 14                      | 10                         | 13                      | -1                                   | 3                                |
| <b>Total</b>           | <b>40</b>         | <b>30</b>               | <b>23</b>                  | <b>28</b>               | <b>-2</b>                            | <b>5</b>                         |
| <b>Grand Total</b>     | <b>450</b>        | <b>338</b>              | <b>291</b>                 | <b>321</b>              | <b>-17</b>                           | <b>30</b>                        |

**Table 5.3**  
**Environmental Evaluation of**  
Jayem Coal Benefication and Power Pvt. Limited  
**Aesthetic Environment**

| <b>Parameters</b>          | <b>Weight<br/>PIU</b> | <b>Baseline<br/>EIU<br/>(a)</b> | <b>Without<br/>EMP<br/>EIU<br/>(b)</b> | <b>With<br/>EMP<br/>EIU<br/>(c)</b> | <b>Change<br/>Without<br/>EMP<br/>EIU<br/>(c-a)</b> | <b>Change<br/>With<br/>EMP<br/>EIU<br/>(c-b)</b> |
|----------------------------|-----------------------|---------------------------------|----------------------------------------|-------------------------------------|-----------------------------------------------------|--------------------------------------------------|
| Topographic<br>Character   | 20                    | 16                              | 14                                     | 15                                  | -1                                                  | 1                                                |
| Landscape                  | 20                    | 16                              | 12                                     | 15                                  | -1                                                  | 3                                                |
| Odour                      | 15                    | 14                              | 12                                     | 12                                  | -2                                                  | 0                                                |
| Visual Quality<br>of Air   | 15                    | 12                              | 9                                      | 10                                  | -2                                                  | 1                                                |
| Visual Quality<br>of Water | 15                    | 11                              | 11                                     | 11                                  | 0                                                   | 0                                                |
| Sound                      | 15                    | 10                              | 7                                      | 9                                   | -1                                                  | 2                                                |
| <b>Total</b>               | <b>100</b>            | <b>79</b>                       | <b>65</b>                              | <b>72</b>                           | <b>-7</b>                                           | <b>7</b>                                         |

**Table 5.4**  
**Environmental Evaluation of**  
Jayem Coal Benefication and Power Pvt. Limited  
**Human Interest**

| <b>Parameters</b>                | <b>Weight PIU</b> | <b>Baseline EIU (a)</b> | <b>Without EMP EIU (b)</b> | <b>With EMP EIU (C)</b> | <b>Change without EMP EIU (c-a)</b> | <b>Change With EMP EIU (c-b)</b> |
|----------------------------------|-------------------|-------------------------|----------------------------|-------------------------|-------------------------------------|----------------------------------|
| Employment                       | 30                | 22                      | 23                         | 25                      | 3                                   | 2                                |
| Economy                          | 30                | 22                      | 24                         | 26                      | 4                                   | 2                                |
| Transportation and communication | 15                | 13                      | 12                         | 14                      | 1                                   | 2                                |
| Community Health                 | 15                | 8                       | 7                          | 9                       | 1                                   | 2                                |
| Occupational Health              | 15                | 12                      | 10                         | 13                      | 1                                   | 3                                |
| Housing                          | 10                | 6                       | 5                          | 7                       | 1                                   | 2                                |
| Education                        | 10                | 8                       | 8                          | 9                       | 1                                   | 1                                |
| Water Supply                     | 15                | 12                      | 10                         | 13                      | 1                                   | 3                                |
| Sanitation                       | 10                | 7                       | 7                          | 8                       | 1                                   | 1                                |
| <b>Total</b>                     | <b>150</b>        | <b>110</b>              | <b>106</b>                 | <b>124</b>              | <b>14</b>                           | <b>18</b>                        |



**Table 5.5**  
**Summary of Environmental Evaluation of**  
**Jayem Coal Benefication and Power Pvt. Limited**

| <b>Parameters</b>       | <b>Weight<br/>PIU</b> | <b>Baseline<br/>EIU<br/>(a)</b> | <b>Without<br/>EMP<br/>EIU<br/>(b)</b> | <b>With<br/>EMP<br/>EIU<br/>(c)</b> | <b>Change<br/>Without<br/>EMP<br/>EIU<br/>(c-a)</b> | <b>Change<br/>with<br/>EMP<br/>EIU<br/>(c-b)</b> |
|-------------------------|-----------------------|---------------------------------|----------------------------------------|-------------------------------------|-----------------------------------------------------|--------------------------------------------------|
| Biological Environment  | 300                   | 194                             | 181                                    | 197                                 | 3                                                   | 16                                               |
| Environmental Pollution | 450                   | 338                             | 291                                    | 321                                 | -17                                                 | 30                                               |
| Aesthetic               | 100                   | 79                              | 65                                     | 72                                  | -7                                                  | 7                                                |
| Human Interest          | 150                   | 110                             | 106                                    | 124                                 | 14                                                  | 18                                               |
| <b>Grand Total</b>      | <b>1000</b>           | <b>721</b>                      | <b>643</b>                             | <b>714</b>                          | <b>-7</b>                                           | <b>+74</b>                                       |

Chapter Six

Environment  
Management  
Plan

# Chapter 6

# Environment

# Management Plan

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## **6.1 INTRODUCTION**

The EMP includes formulation, implementation and monitoring of environmental protection measures during and after commissioning of the project. By implementing the environmental management plan, pollution due to the plant activities can be mitigated. The EMP list out all these measures for the plant activities. The EMP is prepared keeping in view all possible strategies oriented towards impact minimisation.

## **6.2 ENVIRONMENTAL MANAGEMENT SYSTEM**

The management as a part of its environment policy declared its responsibility and commitment to protect the environment and to ensure the public safety. To realise the implementation of its environmental policy, project management shall adopt an Organisational structure for environmental management.

In M/s Jayem Coal Benefication and Power Pvt. Limited , the management will have a well-established environmental cell for pollution control and it will consist of an Analyst and Engineers, who will engage in regular maintenance of pollution control equipments.

In order to improve product quality, Quality Management System as well as Environmental Management System will be adopted and implemented in the organisation. Environment Policy of the M/s Jayem Coal Benefication and Power Pvt. Limited are framed as under:

### **Environment Policy**

- Prevention of pollution incidental to plant operations, especially air pollution.
- Adopting clean-technology and eco-friendly process in the plant.
- Compliance with all applicable legal & other statutory requirements.
- Conservation of natural resources
- Continual improvement in our environmental performance by implementing Environment Management System IS/ISO: 14001.

Management will be committed to nurture the total involvement and development of all employees to achieve zero failures, zero defects and zero accidents, and thereby attain maximum productivity in a pollution free environment. The Environment Management System provides a structured process, the implementation of which has resulted in an improved environmental performance in the plant

### **6.3 EMP DURING CONSTRUCTION PHASE**

Construction activities related to the project have been studied in detail and discussed below:

- a) Land/Site clearing, road construction.
- b) Foundation, structural and concrete work
- c) Mechanical erection
- d) Material handling and storage, water utilisation.
- e) Transportation and Machinery movement
- f) Temporary shed construction etc.

In case of proposed project, the site is fairly level and clean. The various structures will be so located and designed that minimum levelling work will be needed, before excavation for foundation is started.

During excavation dust will be generated temporarily and nuisance will be minimised by sprinkling water.

During construction phase many worker will be reside at project site. The workers will be provided with temporary dwellings with suitable amenities.

No adverse impact on labour situation is expected. Job opportunity for many local people at the maximum will be created. This will have a beneficial impact on the economy of the surrounding area.

The material transportation by trucks may give rise to some air pollution, mainly due to loading and unloading for small period. It shall be kept in the mind that the dust nuisance during unloading operation will be confined only to the site. The aesthetic of the area is not likely

to be affected since dust nuisance will be limited to the site. Noise pollution during construction phase will be negligible effect on the nearby population, since the impact distance is not likely to be more than 0.4 KM, whereas nearest village situated at 1.0 Km away.

## **6.4 EMP DURING OPERATION AND MAINTENANCE PHASE**

### **6.4.1 Air Environment**

The major pollutant emitted from M/s Jayem Coal Benefication and Power Pvt. Limited will be suspended particulate matter and other major sources in plant will be various material transfer points.

Ambient air quality monitoring carried out around the plant site shows background SPM, but prediction of GLC prove that short term 8 hour average concentration of SPM will be insignificant. Thus, the proposed Project of M/s Jayem Coal Benefication and Power Pvt. Limited will not adversely change the existing ambient air quality.

Modern technology provides a wide range of control equipments for removal of particulate matter. M/s Jayem Coal Benefication and Power Pvt. Limited will adopt latest state of art technology for the removal of particulate from various units of proposed plant. Details of pollution control equipments are given below:

**TABLE-6.1**  
**DETAILS OF POLLUTION CONTROL EQUIPMENTS**

| <b>S. No.</b> | <b>Pollution Control Equipments</b> | <b>Description</b>                                                                                                                                                                                                                                                                                  |
|---------------|-------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1             | Bag Filters                         | The screening/chopping plant will be used for Power Plant and washery. The necessary multi cyclone prior to Bag filter of 20 % higher capacity based on flue gas quantity will be provided to control the air pollution and to meet the norms fixed by Chhattisgarh Environment Conservation Board. |
| 2             | Raw Material Storage and Handling   | Covered trucks will only convey RM and it will be unloaded and stored in the long covered shed. Coal/Husk will be screened /chopped and then conveyed to fuel bunkers located near the boiler unit from where it will be fed to the boiler by Screw/Rotary feeders.                                 |

**TABLE-6.2**  
**DESIGN DATA CUM EQUIPMENT DATA**  
**FOR**  
**PROPOSED COAL WASHERY**

Regular ambient air quality monitoring programme should be carried out in order to understand the pollution levels in and around plant. Monitoring programme as per the norms of CPCB/CECB will be executed.

#### **6.4.2 Noise Environment**

Noise generating sources of the Plant are mainly Boiler, Rotary equipments; feed pumps, conveyor, DG sets, Turbine etc. But no person is required to remain constantly at the above -mentioned units and will go occasionally to check the systems. Noise attenuating devices like earplugs and earmuffs shall be provided to workers exposed to high noise levels. Noise barriers, Silencer and enclosures shall be incorporated in the equipments, which emit high noise level. All basic equipments and various machineries should be kept well maintained.

34 % green belts field are proposed, thus provide good noise barriers. This would be developed around the plant.

#### **6.4.3 Water Environment**

There will be no industrial effluent generated due to proposed projects. Evaporation losses will be made up by treated water. The domestic wastewater generated from the proposed plant will be treated in well - designed septic tank followed by soak pit arrangement. Thus the effluent would get finally dispersed into the soil and no further treatment would be necessary. It is thus presented that instead of any additional negative impact on water quality; there will be a positive impact in the water table due to proposed water harvesting techniques.

#### **6.4.4 Land Environment**

As stated else where the proposed plant is to be accommodated on the barren land which has been purchased by the project proponent.

Only coal rejects will be generated from the washery as a solid waste. Rejects handling and storage system is total closed. The rejects which



would be generated, totally used in the boiler of M/s R.R. Energy, orrisa road Raigarh. For timely storage of rejects pneumatic conveying system would be used. Water will be sprinkled through a water spray nozzle, which is provided in the screw feeders. Then moist rejects will be discharged to covered trucks for disposal.

#### **6.4.5 Biological Environment**

Since there are no notified endangered species in the area, which will be effected due to the plant operational activities, therefore the biological environment would not effected. The impact due to negligible amount dust generation on the biological environment is minimised by well-developed green belt in and around plant.

The extensive tree plantation with broad leaf plant species all around the factory premises and in the open areas a available within factory premises shall be carried out. Industry shall plant at least 1500 – 2000 saplings per ha. with local species. Optimum sizes of green belt will be chosen to alter pollutants from fugitive sources. The prime factors to be taken into consideration for green belt plantation scheme shall be, the nature of pollutants, emission levels and the maximum impacted zones.

The impact due to negligible amount of dust generation on the biological environment is minimised by well-developed green belt in and around the plant. Green belt development is one of the essential pre-requisites against pollution although it may add to the initial cost of the project. However it is considered essential owing to the following reasons.

- Plants act as pollution sinks.

- Green belt helps attenuate noise pollution and also balances ambient oxygen and CO<sub>2</sub> levels.
- It also leads to significant drop in temperature near the factory premises.

Besides various improvement that the tree plantation causes in the aesthetic and climatologically environment of the area, it is well known that properly selected, located and planned trees can help in ameliorating air pollution to a very significant degree. Once fully developed such tree plantation can serve as buffers and shock absorbers against transient and accidental release of pollutants caused by mechanical equipments and human failures.

The main aim of curtain plantation is to restrict the movement of pollutants from inside to outside and vice versa. In washery a thick greenbelt is expected within the boundary line. This curtain plantation will very effective because it resists the trespassing of air born pollutants. All the plants under this section are tall and monoaxial habit. Some plant species are suggestsde hereby for p lantation around the plant area like Cassia, Chakundi, Khair, Gulmohar, Sidu, Eucalyptus, Acacia, Leucena, Albezzia, and Petranjeeva etc. Following species will planted for curtain plantation in around the factory area.

- Eucalyptus hybrid
- Pithecolobium dulce
- Leucaena leucocephala
- Acacia nilocephala

### **Avenue plantation**

Linear plantation along with roadsides is always maintained to achieve the maximum attenuation of air and noise level generated inside the factory. To combine bioaesthetic and pollution abatement needs, two

parallel rows of trees (inner and outer row) should be planted on either side of the roads. The tree species for the purpose as given should be planted 1.5 m apart from tree to tree as well as from row to row.

- Alostonia scholaries
- Lagerstromia flos-reginae
- Ployathia longifolia
- Murraya exotica

### **Ornamental plantation**

Prior to attempting ornamental plantation, the noxious local weeds should be eliminated as far as possible. The available area, according to the demand of the drainage pattern, landscape and building orientation, should be used for planting lawns, hedges, trees, shrubs and seasonal flowers.

The mediate area of each building should be arranged into a lawn, fringed by flowerbeds. The flowering trees and shrubs should occupy the Southern and Western limits of the building compound. In some strategic corners flowering chambers has been used to highlight the visual effect.

### **Foliage and Flowering Plant**

- Ashoka pendula (Ashok)
- Silver oak
- Saraka indica (Sita Ashok)
- Erythraa indica (Pangri)
- Plumaria rubra (Champa)

### **Flowering Shrubs**

- Bougenvillea spectabilis (Baganvilas)
- Thespesia populanea (Sthal padma)
- Poimsettia pukherrima (lalpatta)

- Ixora cocinea (lal rangan)

### **Field Plantation**

Plantation on open stretches of land improve the general ecological conditions of the habitat by adding greenery to the landscape and by providing vast canopy of foilage for sinking of pollutants generated in the area. Such trees have been identified are as follows:

- Terminalia arjune(Arjun)
- Delbergia sisso
- Peltrophorum sp.

Some plants which are dense play very important role in the environment, they have good absorbent quality and absorb pollutants from the surrounding are :

### **Noise Absorbing Plants**

- Azadiracta indica (Neem)
- Butea monosperma (Dhak)
- Grevillea tobusta
- Petrospectmum cerifolium
- Terminalia arjuna (Arjun)
- Acer negunda
- Sytinga vulgaris
- Viburnum lamtana

Trees are very suitable for detecting, recognizing and monitoring air pollution effects. Monitoring of biological effects of air pollutants by the use of plants as indicators has been applied on local, regional and national scale. Trees function as sinks of air pollutants, besides their bio-esthetical values, owing to its large surface area. Annual need of oxygen for one person is met by 150 m<sup>2</sup> of leaf surface i.e. 30-40 m<sup>2</sup>

of greenery. So it is necessary to develop green belt in and around the polluted site with suitable specie to combat the air pollution effectively.

The green belt development not only functions as foreground and background landscape features resulting in harmonizing and amalgamating the physical structures of the mines with surrounding environment, but also acts as pollution sink as indicated above. Thus, implementation of afforestation program is of paramount importance. In addition to augmenting present vegetation, it will also check soil erosion, make the ecosystem more complex and functionally, stable and make the climate more conducive.

The plantation matrix adopted for the green belt development includes pits of 0.3m x 0.3m x 0.3 m size with the spacing of 2.0 m x 2.0m. In addition, earth filling and manure may also be required for the proper nutritional balance and nourishment of the sapling. It is also recommended that the plantation has to be taken randomly and the land scaping aspects could be taken into consideration.

For the purpose of pollution attenuation green belt shall be developed in three tiers as stated below:

**First tier:** - Shrub species is having good level of air pollution tolerance limits, which is referred to as tolerance zone.

1. Broken or interrupted: The branching pattern and canopy formation is not uniform e.g. palm varieties in between the shrub species at regular intervals in the first tier.
2. Drooping canopy: The branches and leaves droop downwards e.g. *Polyalthiya longifloia*. In between the shrubs in the first tier .

**Second tier:** Tree having fast growth potential with conical canopy called dispersion zone .

1. Round type: the shape of the crown is more or less rounded; branches and leaves are closely *arrangede.g. Ficus* species. Suitable for second tier.
2. Flat topped canopy: The branches of the crown uniformly given flat topped crown and the spread of the crown is wide to cover wide to cover a wide area e.g. *Cassia fistula*. Suitable for second and third tier.

**Third tier:** These having hairy leaves and thick and round canopy called as absorption zone .

1. Cylindrical type: The branches and leaves from close network and give the longitudinal spread e.g. *Dalbeggia* species should be planted in between the trees in the third tier.
2. Chimney type: The branches give the appearance of long chimney e.g. *Eucalyptus* sp. Outer rows of the third tier.
3. Conical type: The growth of main stem and horizontal branches appear in the form of a cone e.g. *Casuarina*. Peripheral rows of the third tier.

### **Selection Criteria of plant species for Green Development Plant**

The selection of plant species for the development depends on various factors such as climate, elevation and soil. Area falls under the tropical region and thus the plants that area adapted to these condition should be selected. The plant should exhibit following characteristics in order to be selected for plantation .

1. The species should be fast growing and providing optimum penetrability.
2. The species should be wind firm and deep roo ted
3. The species should form a dense canopy.
4. As far as possible, the species should be indigenous and locally available

5. Industry shall plant at least 1500 – 2000 saplings per ha. with local species.
6. Species tolerance to air pollutants like SPM, SO<sub>2</sub>, and NO<sub>x</sub> should be preferred.
7. The species should be permeable to help create air turbulence and mixing within the belt.
8. There should be no large gaps for the air to spill through.
9. Tree with high foliage density, leaves with larger leaf area and hairy on both the surface.
10. Ability to withstand conditions like inundation and drought.
11. Soil improving plants (Nitrogen fixing, rapidly decomposable leaf litter).
12. Attractive appearance with good flowering and fruit bearing.
13. Bird and insect attracting tree spacing.
14. Sustainable green cover with minimal maintenance.

#### **6.4.6 Health and Safety**

Occupation safety and health is very closely related to productivity and good employer-employee relationship. The main factors of occupational health in plant are fugitive dust and noise. Safety of employee during operation and maintenance of equipment and handling of materials are proposed to be taken care of as per regulations. To avoid any adverse affects on the health of workers due to dust, heat, and noise sufficient measures have been provided in the project.

During operation of the plant, care should be taken to ensure healthy and safe working conditions for all workers. Periodical medical check up is necessary. Provisions of pure and clean drinking water, safety provisions, training of all personnel to deal with accidents are required for an effective environmental management.

The M/s Jayem Coal Benefication and Power Pvt Ltd. is conscious of its moral and legal obligation to prevent hazards and to provide healthy working environments. They are proposed to do the following activities:

- Provision of rest shelters for workers/staff with amenities like drinking water, fans, toilets etc.
- Provision of personal protection devices to the workers;
- Rotation of workers exposed to noise premises;
- Dust suppression of road; and
- First-aid facilities in the plant area.
- The management should make annual budget for the safety and health of their employees and provide sufficient facilities in order to effectively implement the health and safety measures.
- The management shall carry out periodical audit of safety and health with view to ascertaining the effective implementation of policy.
- Regular medical examination shall be conducted for the employees. The Medical Officers renders timely advice to the Management on preventive measures and safe guards.
- A safety Committee under MP Factory Rule 1962, under the chairmanship of the Vice President (Mech.) shall be constituted.
- Emergency Plan duly approved by the Director, Industrial Health and Safety shall be prepared and will be updated periodically.

#### **6.4.7 Institutional Arrangement for Pollution control**

Environment division of M/s M/s Jayem Coal Benefication and Power Pvt Ltd. will be responsible for environment management activities. The Department should be nodal agency to coordinate and provide



necessary service on environmental issues during operation and maintenance of the plant.

Environment cell is formed for overall activities for implementation of Environment Management Plan, compliance of statutory requirements as well as interaction with regulatory bodies namely state pollution control board, etc.

**TABLE – 6.3**  
**SUMMARY OF ENVIRONMENTAL MANAGEMENT PLAN**

|                       |                                                                                                                                                                                        |
|-----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>AIR</b>            | Periodical maintenance of pollution control equipments, regular Ambient Air Quality, Stack Monitoring and well developed green belt.                                                   |
| <b>WATER</b>          | Proper sanitary facilities shall present in the plant to inhibit ground water pollution, treatment system shall be provided for industrial as well as domestic waste water management. |
| <b>NOISE</b>          | Regular Maintenance of machinery & well developed green belt. Provision to provide sound protective devices.                                                                           |
| <b>SOLID WASTE</b>    | Coal rejects shall be transported to respective power plant for power generation.                                                                                                      |
| <b>BIO-MONITORING</b> | Annual medical check up of all employees and various safety measures for employees shall be taken.                                                                                     |

## **6.5 Environmental Control and Monitoring programme**

Success of any environmental management programme depends upon the efficiency of the organisational set up responsible for the implementation of the programme. Regular monitoring of the various environmental parameters is also necessary to evaluate the effectiveness of the management programme, so that necessary corrective action would be taken up in case there are some draw back in the proposed programme.

### **6.5.1 Environmental Cell**

Keeping the utility of the monitoring results in the implementation of the environmental management programme, an organisation is required to be established under Manager Environment system. The team will be responsible for:

1. Collection for air and water samples, work zone monitoring for air pollutants
2. Analysis of water and air samples
3. Implementation of control and protective measures
4. Co ordination of environmental related activity within the project as well as with outside agency
5. Collection of statistics of health of workers and population of surrounding villages
6. Green belt development
7. Monitoring the progress of implementation of environmental management programme

Further duties area also expected from the EMMD:

- EMMD will chalk out a site-based strategy to control pollution. The strategy should include formulation of code of action for controlling air, water, noise, soil pollution, phase wise afforestation, and also actions to be taken in respect of socio-economic development. Frequency of

monitoring/sampling and inspection of various parameters/factors will also be planned.

- EMMD will oversee that environmental control measures are implemented as per approved action plan
- Plan conservation programmes in respect of water, waste and energy
- Identify and record the constraints in respect of environmental planning and implementation
- Systematically documentation of all the field monitoring and laboratory analysis results.
- Analyse the monitoring results and also inspection findings. The results can be compared with various standards/norms. EMMD will prepare periodic progress reports, which will include the analysis and inspection results. Environmental audit results and action taken also should be systematically documented.
- Planning of management responsibilities defined for various environmental matters. This should be displayed in the notice board in the office of EMMD
- Interaction and liaison with HO officials and also with state/ central Govt. department.

### **6.5.2 Monitoring Schedule and Parameters**

The purpose of environmental monitoring is to evaluate the effectiveness of implementation of Environment Management Plan (EMP) by periodically monitoring the important environment parameters within the impact area, so that any adverse affects are detected and timely action can be taken.

In consultation with MOEF/C.E.C.B., environmental quality within and around the project site shall be monitored in accordance with an approved monitoring schedule. The monitoring programme and

monitoring location shall be framed carefully. Monitoring programme shall be organised, based on the predicted impacts as given below :

**Table no. 6.4**  
**Suggested Monitoring Programme**

| <b>S. No</b> | <b>Environmental Attributes</b>           | <b>Locations</b>                    | <b>Parameters</b>                                  | <b>Period and Frequency</b>                                                                                        |
|--------------|-------------------------------------------|-------------------------------------|----------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|
| 1            | Ambient Air quality                       | 4 Fixed stations                    | SPM, RSPM, SO <sub>2</sub> , NO <sub>x</sub> , CO  | 24 hr. average samples, Two days per week and 4 week per season during operation phase                             |
| 2.           | Water Quality of surface and ground water | Around the site                     | 28 parameters as per GSR 422 (E)                   | Once in a season at 4 location                                                                                     |
| 3            | Drinking water                            | Project site                        | Drinking Water parameters as per IS 10500 19.05.93 | Pre Monsoon and Post Monsoon.                                                                                      |
| 4            | Ambient Noise                             | Ambient Air Quality monitoring site | dB (A) levels                                      | Hourly day and night time Leq levels every month during construction phase & every quarter during operation phase. |
| 5            | Inventory of                              | -                                   | Tree Plantation,                                   | Once in a year                                                                                                     |

| <b>S. No</b> | <b>Environmental Attributes</b>         | <b>Locations</b>       | <b>Parameters</b>                                           | <b>Period and Frequency</b> |
|--------------|-----------------------------------------|------------------------|-------------------------------------------------------------|-----------------------------|
|              | Flora                                   |                        | Survival                                                    |                             |
| 6            | Water Discharge for Plantation purposes | Plant Area             | Parameters for horticulture use - BOD, pH, SS and Coliforms | Monthly                     |
| 7            | Soil Quality                            | In and around the site | Organic matter, C, H, N, alkalinity, Acidity, heavy metal   | Annual                      |

### **6.5.3 EMP Implementation and Monitoring**

A large part of the sampling and measurement activities will be concerned with long term monitoring aimed at providing an early warning of any undesirable changes or trends in the natural environment that could be associated with operation and allied activities. This is essential to determine whether the changes are a response to a cycle of climatic conditions and associated activities.

In particular, monitoring strategy is required to ensure that all environmental resources, which may be subjected to contamination, are kept under review. Monitoring of the individual elements of the environment is necessary.

To meet the above objective an Environment Management and Monitoring Department (EMMD) will be formed at plant, which will be responsible for implementation of EMP and post operation monitoring. The following items will be considered under the monitoring schedule.

### **6.5.4 Re - Vegetation & Green Belt development**

The schedule of green belt development projected in EMP will be checked after every year and any alteration required will be implemented. Post plantation status will be regularly checked in every season. Phase wise development in the areas of plantation including rate of growth, survival rate etc. will be recorded systematically.

### **6.5.5 Water Quality Monitoring**

Facilities for monitoring both surfaces run off water, discharge water shall be provided. Ground water, discharge water (Monsoon) and also surface water tanks and walls will be monitored once in every month. Samples will be fully analysed for the parameters specified by MOEF/CGECB.

### **6.5.6 Emission and Air Quality**

Dust prevention and control actions are to be taken. To monitor the effectiveness of these actions, it will be necessary to compare background levels of airborne dust with conditions downwind and to back this up with an adequate meteorological measurement season.

Two RDS complete with particle size partitioning and should be capable of collection of SO<sub>2</sub> and NO<sub>x</sub>, CO.

### **6.5.7 Occupational Health**

Facilities for checking levels of dust in the workplace will be provided. Each group of worker will be monitored at regular intervals. The analysis will probably need to be conducted by a specialist. Groups of workers particularly at risk include:

- Conveyor Operator
- Staff deputed near hopper and silos
- Near DG sets

All the usual worker protection measures will be taken to minimise the risk of hearing damage and vibration shocks resulting from proximity to and use of vibratory percussive tools.

### **6.5.8 Socio-Economic Development**

The environmental department will be in regular touch with local surrounding villages to monitor the implementation of various developmental schemes made by the project authority. They will also consider any immediate requirement, which could be taken care of in near future.

### 6.5.9 Up-dation Of EMP

The action plan of EMP should be updated every year with respect to the results achieved and proposed activities for next year. Any new regulation considered by MoEF/ SPCB/CPCB should be taken care of budget sanctions and should be made while updating EMP.

## 6.6 Budgetary Provision for Environmental Monitoring

**Table No. 6.5**

### Capital Investment for Environmental Protection (Rs. in Lacs)

| S. No.                          | Particular               | No     | Cost        |
|---------------------------------|--------------------------|--------|-------------|
| <b>I. Pollution Control</b>     |                          |        |             |
| 1.                              | De Dusting System        | 01 set | 08          |
| 2.                              | Multi cyclone            | 04     | 10          |
| 3.                              | Water Sprayer            | 06     | 1.5         |
| 4.                              | Septic tank and Soak Pit | 02     | 0.7         |
| 5                               | Neutralisation Tank      | 02     | 3.0         |
| 6                               | Storm Water Drains       | LS     | 3.0         |
| <b>Total</b>                    |                          |        | <b>26.2</b> |
| <b>II. Pollution Monitoring</b> |                          |        |             |
| 1.                              | RDS                      | 2      | 2.0         |
| 2.                              | Laboratory               | LS     | 05          |
| <b>Total</b>                    |                          |        | <b>7.0</b>  |
| <b>III. Occupational Health</b> |                          |        |             |
| 1.                              | Fire Fighting equipments | LS     | 1.5         |
| 2.                              | PPE                      | LS     | 1.0         |
| 3.                              | Welfare                  | -      | 5.0         |
| <b>Total</b>                    |                          |        | <b>7.5</b>  |
| <b>IV. Green Belt</b>           |                          | -      | 3.5         |



|                    |  |             |
|--------------------|--|-------------|
| V. Miscellaneous   |  | 2.0         |
| <b>Grand Total</b> |  | <b>46.2</b> |

Annual expected cost of monitoring and implementation of control measures is given in table 6.6.

**Table No. 6.6**  
**Recurring cost for Environmental Protection**

| <b>S. No.</b> | <b>Particulars</b>                                                 | <b>(Rs.) Lacs per annum</b> |
|---------------|--------------------------------------------------------------------|-----------------------------|
| 1             | a) Air Pollution Control                                           | 14.0                        |
|               | b) Water Pollution Control                                         | 17.0                        |
| 2             | Pollution Monitoring                                               | 09.5                        |
| 3             | Occupation Health                                                  | 04.0                        |
| 4             | Green Belt                                                         | 03.5                        |
| 5             | Others (EIA/EMP, Rehabilitation, Realignment, Expert advices etc.) | 02.5                        |
| 6             | Welfare activity                                                   | 07.0                        |
|               | <b>Total</b>                                                       | <b>57.5</b>                 |

### **6.7 Awareness and Training**

Training and human resource development is an important link to achieve sustainable operation of facility and environmental management. For successful functioning of the project, relevant EMP's should be communicated to the every level people from top management to bottom level.

### **6.8 Record Keeping**

Record keeping and reporting of performance is an important management tool for ensuring sustainable operation of this mine.

Record should be maintained for regulatory monitoring and Operational issues.

### **6.9 Environmental Audit and Corrective Action**

To assess whether the implemented EMP is adequate, environmental cell of this unit should carry out internal audits. This audit will provide further area for improvement. Corrective action must be carried out after the completion of audit, where is required.

### **6.10 Conclusion**

On the basis of Rapid EIA study, we strongly feel that the management will operate the plant with care from environmental point of view and due to proposed activities there will be no negative impact.

The proposed Coal Benefication project of M/s Jayem Coal Benefication and Power Pvt Ltd. at village – khedapali, Tehsil-Kharsia, District-Raigarh in the state of Chhattisgarh will be environmental compatible to the surrounding due to the high standards of pollution control measures to be adopted during the operation activity. Thus it can be safely stated that the proposed activities will not have any adverse effect on the surroundings, if the proper environmental management plan is adopted.

## Chapter Seven

# Disaster Management Plan

# Chapter 7

# Disaster

# Management Plan

## **7.1 BACKGROUND**

Any undesirable happening of such magnitude & nature resulting in adversity production, loss of life & property, damage to the environment etc. is termed as disaster. A heavy toll or loss in terms of life imbalance in environment, failure in achieving targets etc. can be caused by accident owing to either any major or a number of minor failures. Risk assessment thus forms an integral part of Disaster Management.

It is therefore essential to ensure safety and reliability to avoid any accidental occurrence in any industrial set-up. This is done by a systematic study of the industrial installations to identify possible failures and prevent their happening/occurrence and avoid the same which otherwise can result into a disaster. The following risk assessment, On-site Disaster Management Plan and Health & Safety policy will be in practice at the M/s Jayem Coal Benefication and Power Pvt. Limited, which shall be further strengthened time to time.

### **7.1.1 Risk analysis and assessment**

Risk analysis includes risk identification and risk assessment. Risk identification can be as simple as putting "what if" question at all designing reviews. Check list of normal process hazards associated

with each and every equipment installed can also be prepared.

Risk assessment can be done by many techniques such as Hazards and Operability Study (HAZOP), Fault Tree analysis, Monte Carlo Simulation, Safety Audits and Safety Indices, etc. All these techniques can identify all major Hazards and also minor hazards associated with them.

For effective Disaster Management plan the industry should have the following details readily available with it:

- a) Description of various processes
- b) Process Engineering flow scheme
- c) Operation manuals for all machinery
- d) Plant and equipment layout
- e) Details on population, density and related data on the surroundings of plant.
- f) Data on status of existing facilities for emergency preparedness
- g) Existing/Proposed fire fighting facilities.

### **7.1.2 Technical Prerequisites and Recommendations**

The statutory regulatory authorities shall as per engineering standards, which will take care of the latest rules and regulations, stipulate the layout and design of the Power Plant.

As such there are no toxic and hazardous substances used/stored at the plant in substantial quantities. The plant shall have storage facility for coal and coal rejects, which shall be stored in two piles. The storage facilities are in accordance to the Tariff Advisory Committee.

In addition to this, necessary fire-fighting facilities shall be provided as per standard norms.

Wherever necessary, water spray system shall be provided to control the hazard. The plant shall get the proper barrier and obstrucater for

safe guard and other critical equipment regularly checked for safety to avoid any hazard and or accident.

## **7.2 PROCEDURES**

Beside the Operating Emergency, Fire or Disaster Handling Procedures have to be implemented to handle the emergency situations. Additional safety procedures to be followed are as given below:

### **7.2.1 Procedure for Preparation of Equipment for Repairs or Maintenance**

This procedure is to assure safe condition of equipment, pipelines, vessels, pumps, compressors etc., before permitting repairs or maintenance work.

### **7.2.2 Work Permit procedure**

The "Work Permit Procedure" is to ensure that the equipment and conditions of a proposed job are made safe for the person(s) who may be required to carryout the job and to observe and maintain conditions required or safe completion of the job.

### **7.2.3 Fire & Safety Permit Procedure**

This procedure is primarily to ensure avoidance of any potential life or fire hazard by establishing uniform measures to control and safe guard operation involving source of ignition or hazard of person nel or installation or combination of both.

### **7.2.4 Tagging Procedure**

This procedure is to prescribe the use of "TAGS" to caution, notify or instruct employees of any hazard or condition of equipment on temporary basis as a' safety measure.

### **7.2.5 Locking & Unlocking Procedure**

- i) Equipment powered by Electricity
- ii) Equipment powered by Hydraulic, Pneumatic & Steam.

This procedure is to prevent any injury to any person who has been authorized to carryout any work in, on or around equipment or vessel connected with power, e.g. electricity, hydraulic, pneumatic or steam.

### **7.2.6 Accident Reporting and Investigation Procedure**

This procedure is to outline the actions for immediate notification of accidents and investigation both orally and in writing, to ensure that:

- i) Cause is revealed for corrective action to prevent similar accidents .
- ii) Government authorities are informed as per the statutory rules.

### **7.2.7 Procedure of Medical Treatment**

This procedure is to enable every employee to avail medical facilities in the plant at all hours while on duty.

### **7.2.8 Operating Emergency, Fire or Disaster Inspection Procedure**

This is primarily to assign duties and responsibilities to all employees to handle the emergency situations in an organised and effective manner to control and eliminate the risk quickly.

### **7.2.9 Procedure on Safety Meetings**

This is to involve all employees in the business of safety as employee participation is essential to the success of any safety programme.

### **7.3 Preventive Measures**

In addition to the above, other preventive measures to be taken are:

- a) Periodical checking of wiring, fittings, and equipment. Immediate removal of all combustible and flammable material from the vicinity of sources of ignition.
- b) All welding/cutting operations should be carried out taking suitable precautions under permit procedure in consultation with the officer-incharge of the Plant and the Fire and Safety Division.
- c) All plant equipment; lines, vessels and storage should be inspected in all shifts for leakage. All such leakage if found should be stopped and attended to at once.
- d) Areas where spontaneous combustion is possible due to storage of material or in scrap yard should be inspected regularly for immediate control of fire on its cut break.
- e) Internal combustion engines should not be permitted to operate in hazardous plan/areas. Whenever permitted, authority and under permit procedure.
- f) Housekeeping should be done in all shifts to remove cotton/Jute soaked in oil, grease, oil kept in trays etc. and removed for safe disposal.



- g) Stacked material which can generate heat or can spontaneously ignite should be inspected regularly to detect any fire. Material should be stacked with sufficient space in between the rows to permit free circulation of air and remove any heat, if generated.
- h) Plant or machines/equipment should be operated under close supervision. Any malfunction should be attended to at once before it can lead to breakdown, fire or any such dangerous occurrence.
- i) Air-conditioning equipment should be inspected regularly and defects attended to at once.
- j) Dry grass and vegetation should be cut as and when required.
- k) Smoking should be prohibited in the Plant premises. It may be allowed in the safe locations outside the plant area.
- I) No source of ignition should be permitted in the area near a fire hazard installation. Sources of ignition should be regularly inspected for correction.
- m) For storing chemicals and other materials, the following measures should be adopted.
  - i) All racks in stores should be maximum stability anchored together at top to provide maximum stability.
  - ii) The materials should always be stored from bottom upwards and not the other way.
  - iii) Since there could be a possibility of some of the chemicals being mutually reactive, those should be carefully segregated and separately stored. All chemicals should be labeled with some colour coding indicating their quality from the point of view of inflammability, corrosively etc.

## **7.4 POSSIBLE RISKS AND THEIR CONTROLS**

### **7.4.1 MAJOR FIRE HAZARDS**

**a) Possible Places: RM Storage & Handling System**

- i) Good house keeping.
- ii) Machanised Stacker and Reclaimer to be installed.
- iii) Safe distance from the main Plant and Machinery.
- iv) Provision of fire hydrants with high -pressure hoses.

**b) Possible Places: Sub Station**

Electrical Panels and Electrical Installations Controls:

- i) Transformers are loaded below their normal capacity.
- ii) Non-inflammable transformer oil is used.
- iii) Necessary protection on primary and secondary side of transformer.
- vi) Proper earthing connection.
- v) Periodical maintenance and testing of earthing pits and panels.
- vi) Provision of required Dry Chemical Powder and CO<sub>2</sub> type fire extinguishers.

**7.4.2 Minor Fire Hazards**

**a) SLOW ISOLATED FIRE:**

**Possible Place:** Any where in the plant where waste materials \ Lubrication oil lies.

: Stores Controls:

- i) Good House Keeping.
- ii) Proper safety Training of workers and Supervisors.
- iii) Provision of required fire fighting equipments.
- iv) Training of fire fighting

**b) ELECTRICAL FIRE:**

**Possible Place: Any where in the Plant at the Electrical systems**

Controls:

- i) Periodical maintenance & testing of Electrical Systems.
- ii) Adequate Earthing.
- iii) Qualified and trained supervisors.
- iv) Training of workers
- v) Provision of dry chemical powder and CO<sub>2</sub> type fire extinguisher.

**c) MECHANICAL ACCIDENTS:**

**Possible Place: Any where in the plant where machines are in operation.**

Controls:

- i) Proper machine guarding.
- ii) Periodical maintenance of machines and guards.
- iii) Training of Supervisors and workers.
- iv) Exhibition of Safety Posters.

**d) FAILURE OF ANY STRUCTURE OR CRANE, LIFTING TACKLES**

**Possible place: Any where in the plant where loading and up loading is in operation.**

Controls:

- i) Periodical maintenance/testing of plant machines and structures.
- ii) Testing by competent persons.
- iii) Management checks.

**e) FAILURE OF ANY PRESSURE VESSEL:**

Possible Place: **Any where in the plant where such system exists.**

Controls:

- i) Periodical testing by the competent persons as per ru les.
- ii) Safety Valves are checked regularly.
- iii) Management's check.
- iv) Trained Supervisors and workers.
- v) Exhibition of Safety workers instructions and posters.
- vi) Water is drained from receivers periodically.

## **7.5 Fire Fighting and Management**

**7.5.1** The design features of the plant include all safety and emergency features as per the Traffic Advisory Committee. However, in the event of any accident, it is proposed to make arrangement of one vehicle round the clock.

Adequate fire fighting facilities, equipment and trained personnel are available round the clock to fight any type of fire. Persons trained in first-aid, medical and rescue operations are also available on 24 hour call basis. All fire fighting equipment is tested and checked regularly.

### **7.5.2 Portable Chemical Fire Extinguishers**

The fire protection system for the unit is to provide for early detection, alarm, containment and suppression of fires.

These are intended as a first line of defense, and hence will be located at strategic locations in different buildings and also for outdoor facilities. Portable fire extinguishers will be of foam type, carbon dioxide type and multipurpose dry chemical (MPOC) type. Various areas in the plant will have one or more of the above system depending upon the particular nature of risk involved in that area.

Other provisions include the following

1. A direct communication line between the unit and nearest medical center.
2. A wind bag type wind direction indicator to be installed to show wind speed flow, direction and approximate strength.
3. Some of the operating personnel shall be given first aid training particularly against fire hazard & acid exposure. In addition a fully equipped first aid center, including sufficient storage of medicines.
4. A green belt consisting of tall plants and shorter shrubs of fast growing variety should be installed thus reducing the concentration and dispersion of emissions area.

## **7.6 ON-SITE EMERGENCY PLAN**

The Management will give lot of importance of Safety of men, machine yards and tools etc. The management should also take keen interest in prevention of all such incidents/accidents that may result into damage or loss of life. It also realizes that even the smallest incident may take a serious turn and give rise to a major emergency. Therefore, they should develop and formulate an ON-SITE EMERGENCY PLAN for the plant, which specifically lies down and stipulates the responsibilities, duties and functions of all the individual officers and workers in case of an emergency. It should also lays down the procedure and system for taking decisions to call mutual aid schemes or any out -side help from Government agencies, State/District Authorities as the situation may be (like help from police, fire brigade and hospital etc.) and also to initiate the Off-Site Emergency Plan/ Procedure. Incident Controller or Shift Executive Incharge will control it by the Site controller or in his absence.

### **7.6.1 Main elements of the Emergency plan:**

1. Identification of Hazard Chart :

As mentioned above in Selection 7.6 following sites are indicated

as the possible areas, places and type of likely hazards:

- |                                |      |
|--------------------------------|------|
| i) Fuel Yard                   | Fire |
| ii) Fuel Hoppers               | Fire |
| iii) Oil/Diesel/Grease Storage | Fire |
| iv) Sub-station                | Fire |
| v) Other Storage Yards         | Fire |

2. Appointment of Key Persons :

In case of any incident following persons act as key persons.

- i) Site Controller - President (Plant)
- ii) Incident Controller - Factory Manager  
(In this absence Vice President (Prod.))
- iii) Communication Officer - VP (Comml.)/ VP (Admn.)
- iv) Utility & Services Officer - Sr. General Manager (Tech.)
- v) Safety & Fire - Safety Officer / Fire Officer
- vi) Traffic Controller - Chief Security Officer
- vii) Telephone Operator
- viii) Electrical In-charge - General Manager (Elect.)
- ix) Water Pump In-charge
- x) First Aid & Medical Facilities available at site

3. Emergency Control Center :

The office of the Plant, Main Gate 1 will be used as emergency Control Center where all the facilities such as office telephone, list of essential telephone numbers, list of key persons and their telephone numbers and addresses etc. will be available.

4. Assembly Points :

In case of any emergency / hazardous even the open space in front of

- i) Gate House

- ii) Auto Workshop area
- iii) Away from Coal Yard.
- iv) Dispatch Gate

5. Procedure to meet Emergency:

Duties, responsibilities and action to be taken by individual i.e. management staff/workers in case of any emergency situation(s) are given as follows:

**a) Communication Systems:**

- i) Electrically operated hooter will be installed at the top of the Main Gate House building. As soon as the call of an incident is received in this building, the Security personnel on duty start the siren to give a general alarm.
- ii) In case of light failure, stand-by auto' start arrangement has been made for 75 KVA generator for lighting and power supply. A brass plate with wooden hammer bell near the main gate in front of Security Office has been installed to make the person alert and to assembly points.
- iii) A Communication Officer, who will have a number of runner/messengers under him to communicate the message to the concerned persons has been appointed.

**b) Emergency Services:**

- i) Fire Hydrants System with separate water pumps, high pressure hoses, buckets, fire fighting tankers (carrying water and mobile pumps) and various types of the fire extinguishers are provided to control the fire at different location and various hydrant points are provided through out the factory as per the general norms fixed under the insurance cover.
- ii) Instruction relating to fire safety and fire fighting materials

displayed at prominent places in the plant. An Executive committee consisting of officers of different section of the plant formed to look after safety requirements. A team of some Security Personnel and other employees are trained for fire fighting.

**c) Control Center:**

As indicated above, the office of the Plant Main Gate will be notified as Control Center, which will have the following facilities:

- i) One external and one internal telephone extensions/connection.
- ii) List of important telephone numbers.
- iii) Stationery materials.
- iv) Contacts for seeking help from out-side regarding fire brigade etc.
- v) For medical and first aid, help of Govt. Hospital at Kharsia can be taken.
- vi) If required, help from police can be taken.
- vii) List of safety equipment available in the plant and the equipment which can be made available' from nearby other industry will be made.
- viii) A Map showing fire hydrant system and hydrant points with available source of water supply.
- ix) One Car/Jeep and one ambulance to be available, which can be used.
- x) Normally 20-30 persons shall be available in every shift besides General Shift and they are available to help in case of an emergency.
- xi) List showing key persons name, their addresses and phone numbers

**7.6.2 Key Personnel & Their Responsibility:**

- i) **Site Controller:** President (Plant) or his nominee will retain overall responsibility for the plant and its personnel. As soon as he is informed



of an emergency, he will proceed to the control room and meet the communication officer. His duties will be:

- a) Asses the magnitude of the situation and decide it if staff needs to be evacuated from their assembly point.
- b) Exercise direct operational control over areas other than the affected one.
- c) Maintain a continuous review of possible development and assess in consultation with Incident Controller and other key personnel, as whether to shutting down of the plant or any section of the plant and evacuation of persons are required.
- d) Liasioning with senior officials of Police, distt Administration, Fire Brigade, Medical and Inspectorate of Factories. Provide advise on possible effects on areas outside the factory premises.
- e) Central rehabilitation of affected area on dis continuation of emergency.
- f) To deal with different agencies such as insurance Company, Police/ Distt. Authorities. Authorities under the Labour Laws etc. after the incident

**ii) Incident Controller:** Factory Manager or Vice President (Prod.) will act as Incident Controller. On hearing of occurrence and take overall charge and report to Site Controller. On arrival he will assess the scale of emergency and decide if major emergency exists or is likely and inform the communication office accordingly. He will

- a) Direct all operations within the affected area (s) with priorities for safety of personnel, damage to the plant, property, environment and loss of materials.
- b) To ensure that casualties, if any, receive adequate and immediate attention, to arrange additional help if required and inform action to relatives.

- c) To control traffic movements within the factory and ensuring that alternate routes are available when the need be.
- d) When an emergency is prolonged, arrangements for the relief of personnel and of refreshments/catering facilities etc.

**iii) Communication Officer:** Vice President (Comml.) Vice President (Admn.) on hearing the alarm, will proceed to control centre and establish immediate communication with the incident controller, He will:

- a) Based on the information received advise the Site Controller of the situation, recommending (if necessary) evacuation of Staff from assembly points.
- b) Deploy suitable staff to act as runners between the Incident Controller and himself, if the walkie-talkie set, telephone and other system of communication fails due to any reason.
- c) Maintain a Log Book of the incident.

**iv) Utility & Service Officer:** Sr. General Manager (Tech.). He will report to the scene of the incident and closed down/startup the services, as desired by the Incident Controller.

**v) Safety & Fire Officer:** They will be responsible for fire fighting. On hearing fire alarm, they will reach to the fire station immediately and advise fire and security staff in the factory about the incident zone and canal the alarm. They will contact and inform through walkie talkie/telephone, messengers to the communication officer, Incident Controller and Site Controller about the incident and its exact location.

**vii) Telephone Operator:**

- a) Attend the telephone call

- b) Note down the messages clearly, including the location of the fire and other relevant particulars.
- c) Blow the fire alarm.
- d) Inform the fire vehicle driver about the actual location of fire/incident.
- e) Note down the message, timings and the details of the person, who reported about the fire incident. He will also record the timings of the departure of fire tender.

**viii) Electrical Incharge:**

On getting the necessary instructions from the Site Controller/Incident Controller he will make sincere efforts to disburse them in right direction. He will further communicate his staff/subordinates to close down/start-up electrical supply as the case may be.

**ix) Water Pump Attendant:**

Two persons identified in each shift will work as fire pump attendants. On hearing the fire alarm they will immediately proceed to pump house to ensure that pumps are 'ON'. If the situation so warrant, extra water pumps can also be started. At the end of emergency, they will be relieved of the duty by the Fire and Safety Officer.

**x) First Aid & Medical Facilities Available At Site:**

First aid boxes at various locations in the plant so as to be readily accessible during all working hours equipped with the prescribed contents. The time office lie will keep in Emergency Control Center, the list of trained persons(Shift wise) who will be available for First Aid Teams.

**Medical Facilities Available at Nearby Area:**

- i) Government Hospital: Kharsia and Raigarh for general treatment,

which is, situated about 33 kms. away from the plant.

- ii) Govt. Hospital, Raigarh, Major accidents and other serious cases are referred to Hospital. Raigarh for treatment, which is, situated about 33 kms.

## **7.7 HEALTH & SAFETY POLICY**

**7.7.1** Preparation of (occupational) Health and Safety policy for the Safety of the workers at work in the factory and the organization itself is solely an obligatory duty of the Occupier in general under the statutory provisions of regulatory legislation (Medical Provision) prescribed in the Factories Act 1948 and also under section 418( 2) *ibid*. In case of hazardous process industries as listed in the first schedule of the Factories Act, it is the legal responsibility of the Occupier to make this Health and Safety policy known to his workers local authority and the Chief Inspector of the Factories as well.

This Health and Safety plan followed by the factory in accordance with the guidelines embodied in the licit provisions of Rule 63B of Factories Rules 1958 amended w.e.f. 27/11/1991 and include the following features:

### **7.7.2 Main Features**

1. It is policy of the company that every reasonable effort shall be made to provide and maintain safe and health working condition of equipment and system of work for all employees.
2. The prevention of accidents or accident hazard leading to personnel injury or damage of equipment / property is recognized as essential and integral part of efficient operation.
3. It shall also be the Endeavour of the factory to ensure that surrounding environment is not adversely effected.
4. Every employee shall follow safety rules / regulations, operating procedures / safe work method design to protect people and equipment from risk of injury or damage to property.

5. The factory shall Endeavour to adequately train all employees suitably to equip them to perform their duties in a safe and effective way.
6. Every employee shall discharge his personal responsibility and shall co-operate and actively participate in maintaining and improving safety standards.
7. A health policy will be framed in consultation with the workers and the policy will be distributed amongst workers. The health policy will be displayed at prominent places so that every worker is aware of it.
8. All necessary safety equipment's / tool will be provided to workers.
9. Adequate supply of clean drinking water, neat and clean toilets and washing facilities will be provided in the factory.
10. Proper ventilation and exhaust fans will be provided in the workshop.
11. Proper protections, steps, guards, will be provided at all required places.
12. Fire fighting equipment like sand buckets and fire extinguishers will be placed at handy places.

# Annexures

## ANNEXURE - I

### National Ambient Air Quality Standards Notification from CPCB

| Pollutant                                                       | Time weighted average | Concentration in ambient air |                                  |                        | Method of measurement                                                                                                                       |
|-----------------------------------------------------------------|-----------------------|------------------------------|----------------------------------|------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                 |                       | Industrial area              | Residential, rural & other areas | Sensitive area         |                                                                                                                                             |
| 1                                                               | 2                     | 3                            | 4                                | 5                      | 6                                                                                                                                           |
| Sulphur dioxide (SO <sub>2</sub> )                              | Annual Average        | 80 µg/m <sup>3</sup>         | 60 µg/m <sup>3</sup>             | 15 µg/m <sup>3</sup>   | <ul style="list-style-type: none"> <li>Improved West and Geake method</li> <li>Ultra florescence</li> </ul>                                 |
|                                                                 | 24 hour               | 120 µg/m <sup>3</sup>        | 80 µg/m <sup>3</sup>             | 30 µg/m <sup>3</sup>   |                                                                                                                                             |
| Oxides of nitrogen as NO <sub>2</sub>                           | Annual Average *      | 80 µg/m <sup>3</sup>         | 60 µg/m <sup>3</sup>             | 15 µg/m <sup>3</sup>   | <ul style="list-style-type: none"> <li>Jacob &amp; Hochheiser modified (Na-Arsenite) method</li> <li>Gas phase chemiluminescence</li> </ul> |
|                                                                 | 24 hours **           | 120 µg/m <sup>3</sup>        | 80 µg/m <sup>3</sup>             | 30 µg/m <sup>3</sup>   |                                                                                                                                             |
| Suspended Particulate Matter (SPM)                              | Annual Average *      | 360 µg/m <sup>3</sup>        | 140 µg/m <sup>3</sup>            | 70 µg/m <sup>3</sup>   | <ul style="list-style-type: none"> <li>High Volume sampling (Average flow rate not less than 1.1 m<sup>3</sup> minute)</li> </ul>           |
|                                                                 | 24 hours **           | 500 µg/m <sup>3</sup>        | 200 µg/m <sup>3</sup>            | 100 µg/m <sup>3</sup>  |                                                                                                                                             |
| Respirable Particulate Matter (size less than 10 microns) (RPM) | Annual Average *      | 120 µg/m <sup>3</sup>        | 60 µg/m <sup>3</sup>             | 50 µg/m <sup>3</sup>   | <ul style="list-style-type: none"> <li>Respirable particulate matter Sampler</li> </ul>                                                     |
|                                                                 | 24 hours **           | 150 µg/m <sup>3</sup>        | 100 µg/m <sup>3</sup>            | 75 µg/m <sup>3</sup>   |                                                                                                                                             |
| Lead (Pb)                                                       | Annual Average *      | 1.0 µg/m <sup>3</sup>        | 0.75 µg/m <sup>3</sup>           | 0.50 µg/m <sup>3</sup> | <ul style="list-style-type: none"> <li>AAS Method after sampling using EPM 2000 of equivalent filter paper</li> </ul>                       |
|                                                                 | 24 hours **           | 1.5 µg/m <sup>3</sup>        | 1.00 µg/m <sup>3</sup>           | 0.75 µg/m <sup>3</sup> |                                                                                                                                             |
| Carbon Monoxide (CO)                                            | 8 hours **            | 5.0 mg/m <sup>3</sup>        | 2.0 mg/m <sup>3</sup>            | 1.0 mg/m <sup>3</sup>  | <ul style="list-style-type: none"> <li>Non Dispersive Infra red (NDIR) spectroscopy</li> </ul>                                              |
|                                                                 | 1 hour                | 10.0 mg/m <sup>3</sup>       | 4.0 mg/m <sup>3</sup>            | 2.0 mg/m <sup>3</sup>  |                                                                                                                                             |

\* Annual Arithmetic mean of minimum 104 measurements in a year taken twice a week 24 hourly at uniform interval.

\*\* 24 hourly/8 hourly values should be met 98% of the time in a year. However, 2% of the time, it may exceed but not on two consecutive days

**Note :**

1. National Ambient Air Quality Standard : The levels of air quality with an adequate margin of safety, to protect the public health, vegetation and property.
2. Whenever and wherever two consecutive values exceeds the limit specified above for the respective category, it would be considered adequate reason to institute regular / continuous monitoring and further investigations.
3. The State Government / State Board shall notify the sensitive and other areas in the respective states within a period of six months from the date of Notification of National Ambient Air Quality Standards.

## ANNEXURE - II

### Ambient noise standards (CPCB Standards)

| S.No. | Area             | Leq dB (A) * |            |
|-------|------------------|--------------|------------|
|       |                  | Day time     | Night time |
| 1.    | Industrial area  | 75           | 70         |
| 2.    | Commercial area  | 65           | 55         |
| 3.    | Residential area | 55           | 45         |
| 4.    | Silence zone *** | 50           | 40         |

- Note :-
1. Day time - 6 am to 10 pm
  2. Night time - 10 pm to 6 am
  3. Silence zone is defined as an area comprising not less than 100 meters around hospitals, educational institutions and courts.
  4. The silence zones are zones which are declared as such by the competent authority.
  5. Mixed categories of areas may be declared as one of the four above mentioned categories by the competent authority.

\* dB(A) Leq denotes the time weighted average of the level of sound in decibels on scale.

A which is relatable to human hearing.

A "decibel" is a unit in which noise is measured.

"A" in dB(A) Leq, denotes the frequency weighting in the measurement of noise and corresponds to frequency response characteristics of the human ear.

Leq It is an energy mean of the noise level over a specified period.



### ANNEXURE - III

#### Indian standards / specification of drinking water IS 10500 -1991

| S.No | Substance or characteristics                                | Requirement / desirable limit |
|------|-------------------------------------------------------------|-------------------------------|
| 1.   | Colour , Hazen units , max                                  | 25                            |
| 2.   | Odour                                                       | Unobjectionable               |
| 3.   | Taste                                                       | Agreeable                     |
| 4.   | Turbidity NTU , max                                         | 10                            |
| 5.   | pH value                                                    | 6.5-8.5                       |
| 6.   | Total hardness (as CaCO <sub>3</sub> ), mg/l , max          | 300                           |
| 7.   | Calcium (as Ca) , mg/l , max                                | 75                            |
| 8.   | Magnesium (as Mg) , mg/l , max                              | 30                            |
| 9.   | Copper (as Cu) , mg/l , max                                 | 1.50                          |
| 10.  | Iron (as Fe) , mg/l , max                                   | 1.0                           |
| 11.  | Manganese (as Mn) , mg/l , max                              | 0.3                           |
| 12.  | Chlorides (as Cl) , mg/l , max                              | 1000                          |
| 13.  | Sulphate (as SO <sub>4</sub> ) , mg/l , max                 | 150                           |
| 14.  | Nitrate (as NO <sub>3</sub> ) , mg/l , max`                 | 100                           |
| 15.  | Fluoride (as F) , mg/l , max                                | 0.5-1.5                       |
| 16.  | Phenolix (as C <sub>6</sub> H <sub>5</sub> OH) , mg/l , max | 0.001                         |
| 17.  | Mercury (as Hg) , mg/l , max                                | 0.001                         |
| 18.  | Cadmium (as Cd) , mg/l , max                                | 0.01                          |
| 19.  | Selenium (as Se) , mg/l , max                               | 0.01                          |
| 20.  | Arsenic (as As) , mg/l , max                                | 0.05                          |
| 21.  | Cyanide (as CN) , mg/l , max                                | 0.05                          |
| 22.  | Lead (as Pb) , mg/l , max                                   | 0.05                          |
| 23.  | Zinc (as Zn) , mg/l , max                                   | 5.0                           |
| 24.  | Anionic Detergents (as MBAS) , mg/l, max                    | 0.2                           |
| 25.  | Chromium (as Cr <sup>6+</sup> )                             | 0.05                          |
| 26.  | Polynuclear Aromatic hydrocarbons<br>(as PAH) , mg/l , max  | -                             |
| 27.  | Mineral oil , mg/l , max                                    | 0.01                          |
| 28.  | Residual free chlorine mg/l , max                           | 0.2                           |
| 29.  | Pesticides                                                  | Absent                        |
| 30.  | Radioactive                                                 | -                             |
|      | a) Gross Alpha activity bq/l                                | 0.1                           |
|      | b) Gross Beta activity bq/l                                 | 1.0                           |

## ANNEXURE - IV

### Classification of inland surface water

| S.No. | Characteristics                              | A <sup>@</sup> | B <sup>@</sup> | C <sup>@</sup> | D <sup>@</sup> | E <sup>@</sup> |
|-------|----------------------------------------------|----------------|----------------|----------------|----------------|----------------|
| 1.    | Dissolved oxygen , mg/l, min                 | 6              | 5              | 4              | 4              | -              |
| 2.    | Biochemical oxygen demand, mg/l , max        | 2              | 3              | 3              | -              | -              |
| 3.    | Total coliform organisms , *MPN 100 ml , max | 50             | 500            | 5000           | -              | -              |
| 4.    | Total dissolved solids , mg/l , max          | 500            | -              | 1500           | -              | 2100           |
| 5.    | Chlorides (as Cl) , mg/l , max               | 250            | -              | 600            | -              | 600            |
| 6.    | Colour , Hazen units, max                    | 10             | 300            | 300            | -              | -              |
| 7.    | Sodium absorption ratio, max                 | -              | -              | -              | -              | 26             |
| 8.    | Boron (as B) \ , mg/l , max                  | -              | -              | -              | -              | 2              |
| 9.    | Sulphates (as SO <sub>4</sub> ), mg/l , max  | 400            | -              | 400            | -              | 1000           |
| 10.   | Nitrates (NO <sub>3</sub> ), mg/l , max      | 20             | -              | 50             | -              | -              |
| 11.   | Free ammonia (as N), mg/l, max               | -              | -              | -              | 1.2            | -              |
| 12.   | Conductivity at 25 °C , micromhos/cm, max    | -              | -              | -              | 1.0            | 2.25           |
| 13.   | pH value                                     | 6.5-8.5        | 6.5-8.5        | 6.5-8.5        | 6.5-8.5        | 6.0-8.0        |
| 14.   | Arsenic (as As), mg/l, max                   | 0.05           | 0.2            | 0.2            | -              | -              |
| 15.   | Iron (as Fe), mg/l, max                      | 0.3            | -              | 50             | -              | -              |
| 16.   | Fluorides (as F), mg/l, max                  | 1.5            | 1.5            | 1.5            | -              | -              |
| 17.   | Lead (as Pb), mg/l, max                      | 0.1            | -              | 0.1            | -              | -              |
| 18.   | Copper (as Cu) , mg/l , max                  | 1.5            | -              | 1.5            | -              | -              |
| 19.   | Zinc (as Zn), mg/l , max                     | 15             | -              | 15             | -              | -              |

\* If the coliform count is found to be more then the prescribed tolerance limits , the criteria for coliforms shall be satisfied if not more than 20 percent of samples show more than the tolerance limits specified , and not more than 5 percent of samples show values more than 4 times the tolerance limits . Further , the faecal coliform should not be more than 20 percent of the coliform .  
Source : Indian Standards (IS: 229 -1982).

<sup>@</sup>  
A - Drinking water source without conventional treatment but after disinfection  
B - Outdoor bathing (organised)  
C - Drinking water source with conventional treatment followed by disinfection  
D - Propagation of wildlife , fisheries  
E - Irrigation , industrial cooling , controlled waste disposal

## ANNEXURE - V

### General Standards for Discharge of Environmental Pollutants Part - A : Effluents

| S.No | Parameter                                           | Standards                                                   |                      |                            |                                                                                                                          |
|------|-----------------------------------------------------|-------------------------------------------------------------|----------------------|----------------------------|--------------------------------------------------------------------------------------------------------------------------|
|      |                                                     | Inland surface water<br>(a)                                 | Public sewers<br>(b) | Land for irrigation<br>(c) | Marine coastal areas<br>(99d)                                                                                            |
| 1.   | Colour and odour                                    | See 6 of Annexure - I                                       | -                    | See 6 of Annexure-I        | See 6 of Annexures                                                                                                       |
| 2.   | Suspended solids mg/l , Max.                        | 100                                                         | 600                  | 200                        | (a) For process waste water - 100<br>(b) For cooling water effluent 10 percent above total suspended matter of influence |
| 3.   | Particle size of suspended solids                   | Shall pass 850 micron IS Sieve                              | -                    | -                          | (a) Floatable solids , Max. 3 mm<br>(b) Settleable solids , max 850 microns                                              |
| 4.   | pH value                                            | 5.5 to 9.0                                                  | 5.5 to 9.0           | 5.5 to 9.0                 | 5.5 to 9.0                                                                                                               |
| 5.   | Temperature                                         | Shall not exceed 5 °C above the receiving water temperature | -                    | -                          | Shall not exceed 5 °C above the receiving water temperature                                                              |
| 6.   | Oil and grease mg/l Max.                            | 10                                                          | 20                   | 10                         | 20                                                                                                                       |
| 7.   | Total residual chlorine mg/l Max.                   | 1.0                                                         | -                    | -                          | 1.0                                                                                                                      |
| 8.   | Ammonical nitrogen (as N), mg/l Max                 | 50                                                          | 50                   | -                          | 50                                                                                                                       |
| 9.   | Total Kjeldahi nitrogen (as N) mg/l Max             | 100                                                         | -                    | -                          | 100                                                                                                                      |
| 10.  | Free ammonia (as NH <sub>3</sub> ) mg/l Max         | 5.0                                                         | -                    | -                          | 5.0                                                                                                                      |
| 11.  | Biochemical oxygen demand(5 days at 20 °C) mg/l Max | 30                                                          | 350                  | 100                        | 100                                                                                                                      |
| 12.  | Chemical Oxygen demand mg/l Max                     | 250                                                         | -                    | -                          | 250                                                                                                                      |
| 13.  | Arsenic(as As) mg/l Max                             | 0.2                                                         | 0.2                  | 0.2                        | 0.2                                                                                                                      |
| 14.  | Mercury (as Hg) mg/l Max.                           | 0.01                                                        | 0.01                 | -                          | 0.01                                                                                                                     |
| 15.  | Lead ( as Pb) mg/l , Max.                           | 0.01                                                        | 1.0                  | -                          | 2.0                                                                                                                      |
| 16.  | Cadmium (as Cd) mg/l Max                            | 2.0                                                         | 1.0                  | -                          | 2.0                                                                                                                      |

|     |                                                                                       |                                                               |                                                               |                                                                  |                                                               |
|-----|---------------------------------------------------------------------------------------|---------------------------------------------------------------|---------------------------------------------------------------|------------------------------------------------------------------|---------------------------------------------------------------|
| 17. | Hexavalent chromium<br>(as Cr-6) mg/l Max                                             | 0.1                                                           | 2.0                                                           | -                                                                | 1.0                                                           |
| 18. | Total chromium<br>(as Cr) mg/l Max                                                    | 2.0                                                           | 2.0                                                           | -                                                                | 2.0                                                           |
| 19. | Copper<br>(as Cu) mg/l Max                                                            | 3.0                                                           | 3.0                                                           | -                                                                | 3.0                                                           |
| 20. | Zinc<br>(as Zn) mg/l Max                                                              | 5.0                                                           | 15                                                            | -                                                                | 15                                                            |
| 21. | Selenium<br>(as Se) mg/l Max                                                          | 0.05                                                          | 0.05                                                          | -                                                                | 0.05                                                          |
| 22. | Nickel<br>(as Ni) mg/l Max                                                            | 3.0                                                           | 3.0                                                           | -                                                                | 3.0                                                           |
| 23. | Cyanide<br>(as CN) mg/l Max                                                           | 0.2                                                           | 2.0                                                           | 2.0                                                              | 0.2                                                           |
| 24. | Flouride<br>(as F) mg/l Max                                                           | 2.0                                                           | 15                                                            | -                                                                | 15                                                            |
| 25. | Dissolved<br>phosphates<br>(as P) mg/l Max                                            | 5.0                                                           | -                                                             | -                                                                | -                                                             |
| 26. | Sulphide<br>(as S) mg/l Max                                                           | 2.0                                                           | -                                                             | -                                                                | 5.0                                                           |
| 27. | Phenolics<br>compounds<br>(as C <sub>2</sub> H <sub>2</sub> OH) mg/l<br>Max           | 1.0                                                           | 5.0                                                           | -                                                                | 5.0                                                           |
| 28. | Radioactive<br>materials:<br>a. Alpha emitters<br>uc/ml Max<br>b. Beta emitters uc/ml | 10 <sup>-7</sup><br><br>10 <sup>-7</sup>                      | 10 <sup>-7</sup><br><br>10 <sup>-7</sup>                      | 10 <sup>-7</sup><br><br>10 <sup>-7</sup>                         | 10 <sup>-7</sup><br><br>10 <sup>-7</sup>                      |
| 29. | Bio-assay test                                                                        | 90% survival of<br>fish after 96<br>hours in 100%<br>effluent | 90% survival of<br>fish after 96<br>hours in 100%<br>effluent | 90% survival<br>of fish after<br>96 hours in<br>100%<br>effluent | 90% survival of<br>fish after 96<br>hours in 100%<br>effluent |
| 30. | Manganese (as Mn)                                                                     | 2 mg/l                                                        | 2 mg/l                                                        |                                                                  | 2 mg/l                                                        |
| 31. | Iron (as Fe)                                                                          | 3 mg/l                                                        | 3 mg/l                                                        |                                                                  | 3 mg/l                                                        |
| 32. | Vanadium (as V)                                                                       | 0.2 mg/l                                                      | 0.2 mg/l                                                      |                                                                  | 0.2 mg/l                                                      |
| 33. | Nitrate Nitrogen                                                                      | 10 mg/l                                                       | -                                                             | -                                                                | 20 mg/l                                                       |

**Ref :** Ministry of Environment and Forest notification, New Delhi, the 31<sup>st</sup> December, 1993.

UOR no 467

Dated 31-03-09

issued by

SEAO

& its Clarification



- The transportation through rail should be explored and proposal along with action plan to be submitted.

## 2. Project Description :

- A brief description of the plant, the technology used and energy conservation;
- All the coordinates of the plant site with toposheet;
- Detailed material balance and water balance, break up of raw coal, washed coal, rejects, coal fines, break up of water requirement as per different activities in the washing operations;
- Source of water supplied for use in washery operations, sanction of the competent authority in the State Government;
- Examine close circuit system for 100% recycling and reuse of the treated effluent in the washery operations or other uses such as irrigating the greenbelt within premises etc.;
- Examine zero effluent discharge conditions;
- Submission of sample test analysis of :
  - I. Characteristics of coal to be washed – this includes grade of coal and other characteristics – ash, S and Hg level etc
  - II. Characteristics – and quantum of washed coal
  - III. Characteristics and quantum of coal waste rejects;

## 3. Description of the Environment :

- Study of alternative sites should also be submitted so as to justify the selected site from environmental angle.
- Study area should cover an area of 10 km radius around the proposed site;
- A study area map of the core zone and 10 km area of the buffer showing major topographical features such as land use, drainage, location of habitats, major construction including railways, highways, pipelines, major industries / mines and other polluting sources, which shall also indicate the migratory corridors of fauna, if any, and the areas where endangered fauna and plants of medicinal and economic importance found in the area;
- Contour map along with the site plan of the project and project land use area statement including land for project operations, such as coal handling plant, washery, building infrastructure, effluent treatment plants, raw coal, washed coal, reject coal, coal fines stock yard, colony, greenbelt, undisturbed area, natural topographical features (such as existing roads, drains, natural water bodies if any) to be left undisturbed, proposed diversion / re-channeling of natural drainage or water courses, if any;
- One complete season site specific meteorological data;
- Information regarding surface hydrology, water regime, hydrogeology and ground water regime;
- Information regarding drainage pattern of the study area;
- Topography of study area, clearly indicating, whether the site requires any filling? If so, details of filling, filling material, quantity of filling material required, filling material supply source and transportation etc. The filling material should be fly/bottom/pond ash of thermal power plants,
- Location of any National Park, Wildlife Sanctuary, Reserve Forest, Protected Forest and Eco-sensitive zones, elephant/tiger reserve (existing as well as proposed), migratory routes if any, within 10 km of

(the project site) be specified and marked on the map duly authenticated by concerned Government department;

- Map showing the core zone delineating the agricultural land (irrigated and un-irrigated), uncultivable land (as defined in revenue records), forest areas (as per records), grazing land and waste land;
- Land use statement of the study area well as project area;
- Collection of one complete season (non-monsoon) primary base line data (along-with dates of monitoring) on environmental quality such as air (RPM, SPM, SOx & NOx), noise, water (surface and ground water), soil;
- The monitoring be conducted as per Central Pollution Control Board's guidelines and parameters for water testing for both ground water as per ISI and surface water as per Central Pollution Control Board guidelines;
- Surface water, ground water, soil, noise and ambient air quality be monitored at-least at eight stations / locations around the proposed site. At-least one monitoring station in the upwind direction/downstream/non-impact non-polluting area as a control station;
- The location of the air monitoring stations decided after taking into consideration the predominant wind direction, population zone and sensitive receptors including Reserve Forests;
- Details of various facilities to be provided for the personnel involved in raw coal / washed coal / rejects transportation & handling in terms of parking, rest areas, canteen, sanitation, and effluents / pollution load from these activities;
- Details of infrastructure facilities such as sanitation, fuel, restroom, canteen etc. to be provided to the labour force including casual workers during construction as well as during operation phase. Effluents / pollution load from these activities be included;
- Details of workshop, if any, and treatment of workshop effluents;
- Occupational health issues, baseline data on the health of the population

#### 4. Environmental Impacts :

- Impacts of project, if any, in the land use, in particular agricultural land, forest land, grazing land, water bodies, drainage of the area and the surroundings;
- Impact of choice of the selected coal washing technology and impact on air quality and waste generation (emission and effluents).
- Impacts of transportation covering the entire sequence of supply, transportation, handling, transfer and storage of raw coal, washed coal and rejects on air quality showing in a flow chart with the specific points of fugitive emissions generation;
- Impact of the project on local infrastructure of the area, such as road network. Examine whether existing roads are adequate to take care of additional load of raw coal / rejects transportation? Whether any additional infrastructure would need to be constructed and the agency responsible for the same with time frame?
- Prediction of impact of project on different environmental components inter-alia (1) air including noise, (2) water (surface and groundwater), (3) soil, (4) flora and fauna and (5) socio-economic. Also take into account the emission from the vehicles and loading & unloading activities;
- Impact of Coal Handling Plant, if any on ambient air and water (surface and ground water) quality;





- Examine the aspects, whether the company be permitted as per regulations to sell rejects / coal fines to nearby power plants and / or to brick kiln manufactures;

**The following general points should be noted:**

- All documents should be properly indexed, page numbered.
- Period/date of data collection should be clearly indicated.
- Authenticated English translation of all material provided in regional languages.
- After the preparation of the draft (as per the generic structure prescribed in Appendix -III of the EIA Notification, 2006) covering the above mentioned TOR issues, the project proponent shall get the Public Hearing conducted and take further necessary action for obtaining environmental clearance in accordance with the procedure prescribed under the EIA Notification, 2006.
- The copy of the letter received from SEAC, Chhattisgarh on the TOR prescribed for the project should be attached as an annexure to the final EIA-EMP report. The compliance statement of TOR prescribed should also be incorporated.

The final EIA-EMP report submitted to SEIAA, Chhattisgarh must incorporate the issues in TOR and that raised in Public Hearing. The index of the final EIA-EMP report must indicate the specific chapter and page no. of the EIA-EMP report where the specific TOR prescribed by SEAC, Chhattisgarh and the issue raised in the Public Hearing have been incorporated.

(S.S. Bajaj)  
Secretary

State Level Expert Appraisal Committee, Chhattisgarh  
Raipur (C.G.)

No. /SEAC-CG/ EC/Coal Ben/RYG/60/09

Raipur, Date /2009

Copy to:-

1. The Secretary, Department of Environment, Mantralaya Chhattisgarh, Raipur-492001.
2. The Chairman, Chhattisgarh Environment Conservation Board, 1-Tilak Nagar, Shiv Mandir Chowk, Main Road Avanti Vihar, Raipur (C.G.)
3. The Chief Conservator of Forests (C) Regional Office (WZ), Ministry of Environment & Forests, Kendriya Paryavaran Bhawan, Link Road No.-3, E-5, Arera Colony, Bhopal.
4. Member Secretary, State Level Environment Impact Assessment Authority, Chhattisgarh. Please find enclosed herewith the original file for your further necessary action please.

(S.S. Bajaj)  
Secretary

State Level Expert Appraisal Committee, Chhattisgarh  
Raipur (C.G.)

Point wise clarification of TOR no 467 SEAC -CG/EC/Coal  
Ben/RYG/60/09 dtd 31.03.09

issued by

State Level Expert Appraisal Committee, Chhatisgarh

| Content of TOR                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Reply of<br>Jayem Coal Benefication & Power P.Ltd.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>1. Source of Raw Coal :</p> <p>* Annual through put of coal for three years.</p> <p>* The sources of raw coal, the details of MOU for linkages of raw coal and list of clients along with copy of agreement between project proponent and company from whom raw coal to be obtained.</p> <p>* List of clients along with copy of agreement between project proponent and companies to whom washed coal to be supplied.</p> <p>* List of clients along with copy of agreement between project proponent and companies to whom the rejects / coal fines to be supplied.</p> <p>* The mode of transport/conveyance of incoming unwashed coal and outgoing washed coal, rejects, coal fines, ash etc. transportation routes showing village, school/colleges, residential area etc to be given.</p> <p>* The transportation through rail should be explored and proposal along with action plan to be submitted.</p> | <p>A part from some medium scale sponge iron plant, One of biggest company of country has given us consent for job work of coal benefication. Capacity of coal benefication process would be 0.96 million ton per year based on raw coal utilization. Letter enclosed (encl one). Various sponge iron companies will ask for coal benefication job work. ( encl one)</p> <p>Washed coal will be given back to same companies, who will give us raw coal for coal benefication purpose. ( encl one)</p> <p>Sister concern of our company i.e. R.R.Energy Pvt. Ltd. will take 100 % rejects / coal fines. The plant is running very efficiently at orrisa road, Raigarh.</p> <p>All transportation will executed with closed dumpers only. A transport route is mentioned herewith on toposheet. We will follow national high way and bypass pathway specially prepared for transportation. (encl two)</p> <p>Robertson railway station would be used for loading of washed coal. However we will explore possibility.</p> |

## 2 Project Description

\* A brief description of the plant, the technology used and energy conservation;

\* All the coordinates of the plant site with toposheet;

\* Detailed material balance and water balance, break up of raw coal, washed coal, rejects, coal fines, break up of water requirement as per different activities in the washing operations.

\* Source of water supplied for use in washery operations, sanction of the competent authority in the State Government;

\* Examine close circuit system for 100% recycling and reuse of the treated effluent in the washery operations or other uses such as irrigating the greenbelt within premises etc.

\* Examine zero effluent discharge conditions.

\* Submission of sample test analysis of:-  
Characteristics of coal to be washed – this includes grade of coal and other characteristics – ash, S and Hg level etc.  
Characteristics – and quantum of washed coal. Characteristics and quantum of coal waste rejects;

## 3 Description of the Environment

\* Study of alternative sites should also be submitted so as to justify the selected site from environmental angle.

A brief description of the plant, the technology used for proposed project are mentioned in REIA chapter no. two. (Para 2.3 and 2.4).

The coordinate of plant site are Latitude 22°06'27" N and longitude 83°07'58" E. The site location is shown on toposheet attached herewith.

Material balance is given in 2.5 of chapter no two.

Water balance is given at para no 2.6.4 of chapter two.

Central ground water board, New Delhi has granted permission for withdrawal of water copy enclosed (encl three)

We will install as given earlier 100% recycle base effluent treatment plant for reuse in process/green belt.

We will install as given earlier 100 % recycle base effluent treatment plant for reuse in process/green belt.

Details of analysis is given at para no 2.6 of chapter two. It may be noted Hg was not reported in any sample.

The mentioned site will be suitable for our proposed project. Since colliery is not far away from our proposed site

from environmental angle.

\* Study area should cover an area of 10 km radius around the proposed site.

\* A study area map of the core zone and 10 km area of the buffer showing major topographical features such as land use, drainage, location of habitats, major construction including railways, highways, pipelines, major industries / mines and other polluting sources, which shall also indicate the migratory corridors of fauna, if any, and the areas where endangered fauna and plants of medicinal and economic importance found in the area;

\* Contour map along with the site plan of the project and project land use area statement including land for project operations, such as coal handling plant, washery, power plant, building infrastructure, effluent treatment plants, raw coal, washed coal, reject coal, coal fines, ash stock yard, colony, greenbelt, undisturbed area, natural topographical features (such as existing roads, drains/natural water bodies if any) to be left undisturbed, proposed diversion / re-channeling of natural drainage or water courses, if any.

\* One complete season site specific meteorological data;

Information regarding surface hydrology, water regime, hydrogeology and ground water regime; Information regarding drainage pattern of the study area; Topography of study area, clearly

& we would be able to do job work of various sponge iron units, thus supply washed coal needed by sponge iron plant in much better manner.

We have covered 10 km radius for study area around the proposed site.

Chapter no three as whole describe base line data of the area.

A copy of toposheet is enclosed showing major feature of the area as asked by your good self (encl four). Major mines Chhal colliery is polluting sources, fall under study area. It may be noted that none of the migratory corridors of fauna was reported near by our proposed site.

Contour map along with the site plan of the project is attached herewith, (encl – five) Regarding building infrastructure and other project data will be finalized after EC. Existing colony, greenbelt, undisturbed area, natural topographical Features, such as existing roads, drains/natural water bodies will not be changed. Proposed diversion of land will be executed after EC. Any re-channeling of natural drainage or water courses will not be there/nor proposed by us.

The total area of the proposed project 8.23 acres. Statement of area is given (encl six).

One complete season site specific meteorological data has been monitored and presented. Please ref para 3.4 of chapter three.

Information regarding water environment is given in para no 3.7 of chapter no three.

indicating, whether the site requires any filling? If so, details of filling, filling material, quantity of filling material required, filling material supply source and transportation etc. The filling material should be fly/bottom/pond ash of thermal power plants;

\* Location of any National Park, Wildlife Sanctuary, Reserve Forest, Protected Forest and Eco-sensitive zones, elephant/tiger reserve (existing as well as proposed), migratory routes, if any, within 10 km of the project site be specified and marked on the map duly authenticated by concerned Government department;

\* Map showing the core zone delineating the agricultural land (irrigated and un-irrigated), uncultivable land (as defined in revenue records), forest areas (as per records), grazing land and waste land;

\* Land use statement of the study area well as project area.

\* Collection of one complete season (non-monsoon preferably winter season 2008) primary base line data (along -with dates of monitoring) on environmental quality such as air (RPM, SPM, SOx & NOx), noise, water (surface and ground water), soil.

\* The monitoring be conducted as per Central Pollution Control Board's

Information regarding topography data is given in para no 3.8 of chapter no three. It may be noted that from our proposed project fly/bottom/pond ash will not be generated.

No such park, wild life, eco-sensitive zone, elephant/tiger reserve within 10 km radius from proposed site has been observed. We have maps from toposheet. The toposheet was printed by survey of India. We think that map drawn by survey of India is authentic and correct.

Please ref para 3.8 chapter three for land details

Project proposed statement of area is mentioned herewith. Please ref (encl – six). Please ref para 3.8 chapter three for land details.

Monitoring and sampling of air (RPM, SPM, SOx & NOx), noise, water (surface and ground water), soil has been done as per CPCB guideline & norms. Please ref para 3.5 chapter three for air monitoring details.

Please ref para 3.6 chapter three for noise monitoring details.

Please ref para 3.7 chapter three for water monitoring details.

Please ref para 3.8 chapter three for land details.

Please ref para 3.84 chapter three for soil sampling & it's analysis details.

The location of the air monitoring stations decided after taking into

guidelines and parameters for water testing for both ground water as per ISI and surface water as per Central Pollution Control Board guidelines.

\* Surface water, ground water, soil, noise and ambient air quality be monitored at-least at eight stations / locations around the proposed site. At-least one monitoring station in the upwind direction/ downstream/non-impact non-polluting area as a control station.

\* The location of the air monitoring stations decided after taking into consideration the predominant wind direction, population zone and sensitive receptors including reserve forests.

\* Details of various facilities to be provided for the personnel involved in raw coal / washed coal / rejects/ash transportation & handling in terms of parking, rest areas, canteen, sanitation, and effluents / pollution load from these activities.

\* Details of infrastructure facilities such as sanitation, fuel, restroom, canteen etc. to be provided to the labour force

consideration the predominant wind direction, population zone and sensitive receptors including reserve forests.

Monitoring and sampling of air (RPM, SPM, SO<sub>x</sub> & NO<sub>x</sub>), noise, water (surface and ground water), soil has been done as per CPCB guideline & norms. Please ref para 3.5 chapter three for air monitoring details.

Please ref para 3.6 chapter three for noise monitoring details.

Please ref para 3.7 chapter three for water monitoring details.

Please ref para 3.8 chapter three for land details.

Please ref para 3.84 chapter three for soil sampling & it's analysis details.

The location of the air monitoring stations decided after taking into consideration the predominant wind direction, population zone and sensitive receptors including reserve forests.

House keeping will be maintained at all places as per suggestions. The precautions will be maintained particularly at all the possible transfer points of coal/reject/ash handling and it's transportation. As per the act best possible facility of health and safety will be made. In house construction will be done of rest room, canteen, sanitation as per labour act. Proper parking place has been identified for parking of two wheelers, car, light & heavy vehicle separately.

Necessary rest room, toilet, canteen etc. will be there for the transporters and labour at distinct location. The same

including casual workers during construction as well as during operation phase. Effluents / pollution load from these activities be included.

- \* Details of workshop, if any, and treatment of workshop effluents.
- \* Occupational health issues, baseline data on the health of the population.

#### 4 Environmental Impacts

- \* Impacts of project, if any, in the land use, in particular agricultural land, forest land, grazing land, water bodies, drainage of the area and the surroundings.
- \* Impact of choice of the selected coal washing technology and boiler technology for power plant and impact on air quality and waste generation (emission and effluents).
- \* Impacts of transportation covering the entire sequence of supply, transportation, handling, transfer and storage of raw coal, washed coal, rejects on air quality showing in a flow chart with the specific points of fugitive emissions generation.
- \* Impact of the project on local infrastructure of the area, such as road network. Examine whether existing roads are adequate to take care of additional load of washed coal / rejects transportation? Whether any additional infrastructure would need to be

facilities will be continue from construction to operation phase. House keeping will be maintained at all places as per suggestions. The precautions will be maintained to balance base line conditions. Effluent load from all possible source has been assessed and presented in chapter no five 5.4 & 5.6. Workshop will be there. None of effluent will be generated from this place. Occupation safety and health is very closely related to productivity and good employer-employee relationship is given in chapter three para 3.10

No adverse impacts of project, on the land use, in particular agricultural land, forest land, grazing land, water bodies, drainage of the area and the surroundings will be there. Please ref chapter five para 5.4 & 5.6.

No adverse impacts of project, on the selected coal washing operation. Please ref chapter five para 5.4 and 5.6.

Adverse impacts of transportation, on the sequence has been assessed, Please ref chapter five para 5.4 & 5.6.

Existing road network are adequate to take care of additional load of transportation. No additional infrastructure development would be required.



constructed and the agency responsible for the same with time frame?

\* Prediction of impact of project on different environmental components inter - alia (1) air including noise, (2) water (surface and groundwater), (3) soil, (4) flora and fauna and (5) socio-economic. Also take into account the emission from the vehicles and loading & unloading activities.

\* Impact on coal handling plant, if any on ambient air and water (surface and ground water quality)

## 5 Mitigation Measures

\* Details of pollution control measures with respect to effluent treatment, air pollutants emission control, noise control and scientific & safe disposal of all solid wastes.

\* Specific pollution control and mitigative measures for the entire process, Specific pollution control / mitigative measures proposed to be put in place at every transfer and handling points.

\* Coal stock yard (raw coal, washed coal, coal rejects and coal fines) be housed in closed sheds in pucca platform above ground level and ash in silo provided with wind shields / wind breaking walls; storage size and capacity of coal stock be decided in consultation with DGMS and Chhattisgarh Environment Conservation Board.

\* Measures for occupational health and safety of the personnel and manpower for the project.

Impacts of project on air quality, water quality, noise generation and flora and fauna will be there. The impacts has been presented in chapter five para 5.4 & 5.6. The same has been computed and given in tables of para 5.7.

Coal handling plant will be there to handle raw coal. We will be installing proper de dusting system and water spraying system to control any emission while loading, unloading and conveying of coal/coal reject.

Details of pollution control measures in case of air, noise, disposal of solid waste has been given in chapter six para 6.4.

Details of pollution control measures in case of coal and reject handling has been given in chapter six para 6.4.

Coal / washed coal stock yard will be constructed as per attached layout. However coal fines and rejects will be transferred directly from washery to R.R. Energy Pvt. Ltd. a power unit. Proper storage will be prepared for specified capacity with shield wall.

Occupational health and safety of the personnel and manpower for the project has been presented in chapter six para 6.4.6.

\* Compliance to the standards (Fugitive emission standards, effluent discharge standards, noise level standards) prescribed for coal washery and power plant by Ministry of Environment and Forests, Government of India / Central Pollution Control Board / Chhattisgarh Environment Conservation Board (which ever stringent).

\* Compliance to the Code of Practice prescribed for coal washery by Ministry of Environment and Forests, Government of India / Central Pollution Control Board.

\* Ensure the particulate matter emission limited to 50 mg/Nm<sup>3</sup>.

\* Scheme for rainwater harvesting.

\* Details along-with action plan for development of greenbelt in 33% land area with not less than 1500 trees per ha giving details of species, width of plantation, planting schedule etc.

\* Details regarding sale/disposal of solid wastes / rejects / coal fine/ash from the unit to miscellaneous purchasers (if any).

## 6 Environmental Management Plan

\* The EIA-EMP report covering the impacts and management plan for the project specific activities on the environment of the region, and the environmental quality – air, water, noise, land, biotic community through collection of data and information, generation of data on impacts for a rated capacity.

Compliance of standards are given in case of air, noise, disposal of solid waste / ash , effluent discharge has been given in chapter six para 6.5.

Compliance of standards are given in case of air, noise, disposal of solid waste / ash , effluent discharge has been given in chapter six para 6.5.

Proposed air pollution control equipments will operate with the limits of 50 mg/NM<sup>3</sup> maximum of particulate matter. Please ref chapter six para 6.4. As per ground water board norms we will execute it. We are enclosing herewith copy of permission issued by competent authority, (encl -three). Please ref chapter six para 6.4.5 for details of plantations planning.

We will give coal rejects to our sister concern R.R. Energy Pvt Ltd a power generation unit located hardly 7 km away from Raigarh.

The EIA/EMP report has been prepared and presented covering all specified data.

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>* Detailed EMP to mitigate the adverse impacts due to project along -with item-wise cost of its implementation (capital and recurring).</p> <p>* Disaster Management Plan and mitigative measures for disaster prevention and control.</p> <p>* Risk assessment to be undertaken, based on the same, propose safeguard measures.</p> <p>* Details along-with action plan and year wise funds to be allocated for ec o-development/community welfare works including maintenance of roads in nearby villages/areas.</p> <p>7 Additional Study:<br/>Public Hearing details covering the notices issued in the newspaper, proceedings/minutes of public hearing, the points raised by the general public and commitments made, in a tabular form. If the Public Hearing is in the regional language, provide an authenticated English translation of the same.</p> <p>* Status of litigations/court cases filed/ pending against the project (all cased including environment) and / or any direction / order passed by any hon'ble court of law against the project, if so, details thereof;</p> <p>* Examine the aspects, whether the company be permitted as per regulations to sell rejects / coal fines to nearby power plants and / or to brick kiln manufactures;</p> | <p>Detail EMP has been prepared and submitted, please ref chapter no six para 6.6.</p> <p>Disaster Management Plan and mitigative measures for disaster prevention and control has been made and presented in chapter no seven. Detail EMP has been prepared and submitted, please ref chapter no six para 6.6.</p> <p>We have planned for regular medical check up camp in nearby village. We will start a school for children in nearby village. A lumsum Rs 15 lacs per year will be invested for the welfare of village as per the wish of panchayat/ local administration.</p> <p>We agree with the rules and regulation and follow the same.</p> <p>Not applicable to us.</p> <p>We will provide rejects to our sister concern, it would be used as fuel in power plant.</p> |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

The following general points should be noted:

All documents should be properly indexed, page numbered.

Period/date of data collection should be clearly indicated.

Authenticated English translation of all material provided in regional languages.

All documents are properly indexed, page numbers given. Data collection period has clearly mentioned. English summary with hindi translation are enclosed.



Rapid Environment Impact Assessment  
of  
proposed project  
of

**Jayem Coal Benefication & Power Pvt. Ltd.**

Vill. Khedapali, Tahsil Kharsia, Dist. Raigarh

By

**The Care**

33, GURUKUL COMPLEX,  
NEAR KALIBADI, RAIPUR  
PHONE : +91 771 4093388  
FAX : +91 771 4066141