

# PRE-FEASIBILITY REPORT

## 1.0 EXECUTIVE SUMMARY

The salient features of the project are given below:

Project name	Jitpur Colliery with production of coal @ Nominal 0.6 MTPA/ Peak 0.7 MTPA
Project proponent	M/s Steel Authority of India Ltd
Block Allottees	Jitpur Colliery has been in operation prior to nationalization. There are two mouzas under Jitpur Colliery viz. Noonudih Mouza (Area: 76.38 ha ) & Jitpur Mouza (Area: 87.31ha allotted to SAIL. .
Villages in the ML area	Noonudih, Jitpur
Latitude	23° 42' 32" north to 23° 43' 14" north
Longitude	86° 23' 05" east to 86° 24' 14" east
Total ML Area	Total Lease Area of Mine = 163.69 Ha .
Capacity	Proposed ROM from Mine @ Nominal 0.6 MTPA/ Peak 0.7 MTPA
Land ownership break up	i) Company Land (SAIL) = 26.37 Ha (Acquired/ Purchased/ Transferred) ii) Govt. Land/ Private Land = 137.32 Ha iii) Forest - Nil Total = 163.69 Ha (Lease Area of Mine)
Reserve	A total of 19.33 MT of Geological reserves with Washery Grade-III are estimated for the proposed virgin seams (XII & XVA seams) for extraction
Rated capacity	Proposed ROM from Mine @ Nominal 0.6 MTPA/ Peak 0.7 MTPA
Life of the mine	23 years @ Nominal 0.6 MTPA/ Peak 0.7 MTPA as per the Project Report
Method of Mining	Underground
Blasting	Short delay detonators
Storage of explosives	02 magazines of capacity 5600 kg & 1000 kg respectively

---

Working days	300
Manpower	243 (as on 31/03/2014)
Transportation	From the mine to Chasnalla Washery through Bi-cable Aerial Ropeway. The washed coal is transported to Steel Plants by Rail.
Expected cost of the project	Rs. 222.69 crores (July 2010 price level) is the proposed capital requirement of the project for expansion of capacity to @ Nominal 0.6 MTPA/ Peak 0.7 MTPA (As per Project Report by SCCL-Option-1 continuous miner).
Elevation	The highest and lowest contours in the area are 177m & 158m respectively.
Topography	The colliery area has a general south-easterly slope. Surface of the lease hold area at Jitpur Colliery slopes slightly from north to south direction. The Drainage pattern over the proposed area is from North to South, all the rain water is being drained out through two drains over east and west of the property and connected to Kari jore, which goes to Damodar river. The jore is on the dip side boundary of the property.
Water requirement	Domestic- 1110 KLD Industrial- 400 KLD
Source of water	Sources : Domestic-MADA (Mineral Area Development Authority) Industrial-U/g Mine pit water
Power requirement and Source	All equipment proposed for this project, are electrically operated. Mine power requirement is for u/g mine operation, lighting, workshop, pumping etc. Power is supplied to the Jitpur colliery through 33kV o/head line from Putki Grid s/station via BSEB Bulihari s/station of DVC. Overall max demand for the project works out to 4.8 MVA for a targeted prod of @ Nominal 0.6 MTPA/ Peak 0.7 MTPA. Existing 33 kV Jamadoba s/station with additional power requirement of 1x 6MVA, 33/11kV transformer is proposed for this project.

## 2.0 INTRODUCTION

### 2.1 Identification of project and project proponent

The applicant is the Collieries Division of Steel Authority of India Limited having its Registered Office at Ispat Bhavan, Lodi Road, New Delhi –110 003. At present,

there are the following three working coal mines of Collieries Division of SAIL for providing coking coals to its steel plants:

1. Chasnalla coal mines, situated in Jharia coal field of Dhanbad District of Jharkhand State. It produces prime coking coal from opencast and underground mines.
2. Jitpur coal mine, situated in Jharia coal field of Dhanbad District of Jharkhand State. It produces prime coking coal from underground mine. Ramnagore coal mine, situated in Burdwan district of West Bengal State. It produces medium coking coal and jhama.

### **Background of the company**

Steel Authority of India Limited is one of the top steel producers in the world with a turnover of more than Rs. 50,000 Crores. The company is among the seven Maharatnas of the country's Central Public Sector Enterprises. SAIL has five integrated steel plants, three special plants, and one subsidiary in different parts of the country.

SAIL traces its origin to the formative years of an emerging nation - India. After independence the builders of modern India worked with a vision - to lay the infrastructure for rapid industrialisation of the country. The steel sector was to propel the economic growth. Hindustan Steel Private Limited was set up on January 19, 1954.

Hindustan Steel (HSL) was initially designed to manage only one plant that was coming up at Rourkela. For Bhilai and Durgapur Steel Plants, the preliminary work was done by the Iron and Steel Ministry. From April 1957, the supervision and control of these two steel plants were also transferred to Hindustan Steel.

The Ministry of Steel and Mines drafted a policy statement to evolve a new model for managing industry. The policy statement was presented to the Parliament on December 2, 1972. On this basis the concept of creating a holding company to manage inputs and outputs under one umbrella was mooted. This led to the formation of Steel Authority of India Ltd. The company, incorporated on January 24, 1973 with an authorized capital of Rs. 2000 crore, was made responsible for managing five integrated steel plants at Bhilai, Bokaro, Durgapur, Rourkela and Burnpur, the Alloy Steel Plant and the Salem Steel Plant. In 1978 SAIL was restructured as an operating company.

Since its inception, SAIL has been instrumental in laying a sound infrastructure for the industrial development of the country. Besides, it has immensely contributed to the development of technical and managerial expertise. It has triggered the secondary and tertiary waves of economic growth by continuously providing the inputs for the consuming industry.

---

## ***Modernisation & Expansion***

SAIL, is in the process of modernizing and expanding its production units, raw material resources and other facilities to maintain its dominant position in the Indian steel market. The objective is to enhance the production capacity to 23.46 MTPA of Hot Metal from the installed production capacity of 13.8 MTPA.

### **2.2 Brief description of nature of the project**

Presently XIV seam is the only working seam in Jitpur Colliery, a being degree three gassy mine. It is being worked by conventional and semi-mechanised longwall method in conjunction with hydraulic sand stowing. The life of XIV seam is 15 years @ 0.13MTPA with extractable reserves of about 1.97 Mt as on 01/04/2009 (As per Project Report by M/s SCCL).

The present production from Jitpur Colliery is about 300t per day.

It has been proposed to upgrade the capacity of existing Colliery to @ Nominal 0.6 MTPA/ Peak 0.7 MTPA. As per the Project Report prepared by M/s SCCL to extract the XII and XVA seam at rate of 2000 TPD, a Mining Plan of a total colliery capacity of @ Nominal 0.6 MTPA/ Peak 0.7 MTPA is under preparation.

The Jitpur colliery has the required infrastructure like stores, workshops, CHP, office buildings, quarters etc. The existing infrastructure is also adequate to enhance production by extraction of seams XII and XVA along with existing working in seam XIV.

### **2.3 Need for the project and its importance to the country and / or region**

Coal produced from Chasnalla & Jitpur coal Mines is sent to SAIL Steel Plants after being washed at Chasnalla Coal Washery. The present requirement and supply of coking coal to SAIL steel plants are as under:-

Coking coal	<b>Requirement</b> (in Million Ton)	<b>Indigenous</b> <b>supply</b>	<b>Imported coal</b>
Before expansion	13.30	4.00 (30%)	9.30 (70%)

Out of above, about 0.5-0.60 mill tones of prime coking coal is available from own sources of SAIL i.e. from Chasnalla & Jitpur collieries. The balance quantities of about 3.5 mill tons of coal is being supplied from CIL sources.

Steel is one of the core industries of the country. It is a critical input to other industries including construction industry, automobiles sector, railways & hosts of other industries. One of the important raw materials for steel making is coking coal of appropriate quality. Coking coal production in India has been stagnating for the past few years. The short supply/availability of coking coal was further accentuated during last couple of years when the market price of coal touched an all-time high and good quality coking coal was in short supply in world market. SAIL is the major consumer as well as importer of coking coal in India. SAIL's requirement of coking coal is likely to increase to 21 million tons from the present level of consumption with implementation of the growth plan.

---

Development of Jitpur Colliery Project is, therefore an imperative for SAIL to augment indigenous coking coal availability.

## 2.4 Demand-supply gap

There is a strong two-way relationship between economic development and energy consumption. The Indian coal industry was nationalized in the early 1970s. Today 55 percent of our primary energy needs and about 70 percent of power generation in India is coal based. The coal demand is projected to increase over two billion tonnes by 2030 and the share of coal in the overall energy mix is envisaged to be in the range of 52 to 62 percent. Country's coal production is hovering around 530 million tonnes presently and we are importing about 67 million tonnes of coal both coking coal, for meeting the requirement of the steel sector and superior quality of non-coking coal for meeting the requirements of the other industries including power sector in the absence of sufficient availability from domestic sources. This shortage situation cannot be allowed to continue and domestic producers have to rise to the occasions in meeting the expectations of consumers. To supplement the efforts of national exploration agencies government is also encouraging private sector to enter into coal exploration. To meet the sharply rising coal demand we need to accelerate the deployment of appropriate technologies and practices that can enhance efficiencies of coal mining while continuing to improve mines safety and reducing the environmental impacts. Coal demand is an aggregate derivative of the overall demand of various sectors which consume Coal. The output for each sector acts as a function of the growth of National Economy. (Source: Coal Summit 2010).

## 2.5 Imports vs. indigenous production

As per the latest estimates the imports may cross 80 million tonnes in the current year and eventually cross 200 million tonnes by 2015-16, 200 million tonnes is about 25 percent of the international trade in coal. So the Indian demand is going to actually make a big difference in the international trade as well. Additional requirement of coal in 2011-12 is 90.35 MT. The details of coal production are given in Table 1.

**TABLE 1  
DETAILS OF COAL PRODUCTION**

<b>Domestic production</b>	<b>11<sup>th</sup> Plan 2011-12</b>	<b>12<sup>th</sup> Plan 2016-17</b>	<b>13<sup>th</sup> Plan 2021-22</b>	<b>14<sup>th</sup> Plan 2024-25</b>
Cooking coal (washed coal)	26(13)	26(13)	35(18)	36(18)
Non-cooking coal	582	734	879	1012
<b>Total production</b>	<b>621</b>	<b>778</b>	<b>942</b>	<b>1086</b>

*Source: Coal Vision 2025 (Source: Coal Summit 2010)*

## 2.6 Export possibility

There will not be any export of coal from the proposed coal block. The Collieries Division, Steel Authority of India Ltd. will supply it on an exclusive basis to their steel plants.

---

## 2.7 Domestic / export markets

Jitpur Colliery is the captive mine of SAIL & for the captive use for their steel plants. Beneficiation of coal is carried out at an existing washery combinedly for Jitpur and Chasnalla Colliery, the washery is located at Chasnalla (ML area). SAIL also plans to establish a new proposed washery with a capacity of 1.2 MTPA. There will not be any export from the mine.

## 2.8 Employment generation (direct and indirect) due to the project

As it is an operational mine, a total 243 number of manpower (as on 31/03/2014) is directly employed in the mine and more than that are there for indirect employment. Continuous Miner technology is proposed for extraction of coal from Seam XII. The average daily attendance required to achieve the proposed rated production of 0.6 MTPA is estimated as 294. After considering absenteeism towards authorized leave, sick etc., the men on roll for the project comes to 347.

The project will further improve the living conditions of the people. The project will generate direct as well indirect employment. The income thus generated will improve the beneficiaries' living conditions.

## 3.0 PROJECT DESCRIPTION

The proposed mine will extract coal at the rate of @ Nominal 0.6 MTPA/ Peak 0.7 MTPA from a mine lease area of 163.69 Ha located at Jitpur & Noonudih villages in District Dhanbad, Jharkhand. The mining operations shall be carried out by Underground method. The Jitpur Colliery is located in the eastern part of the Jharia Coalfield. It is situated at about 15 km from Dhanbad Railway Station.

Detailed exploration was conducted by drilling 21 exploratory bore holes in 1950s. Further, in 1959, five underground boreholes were drilled from the floor of Seam XVI. The detailed geological investigations in the proposed mine have established the presence of 8 No. of coal seams. They are XVIII, XVII, XVIA, XVI, XVA, XV, XIV & XII seams in descending order and varying in thickness from 0.9m to 10.36m. XVA and XII seams are virgin and proposed for extraction in future after the present working seam XIV exhausts.

### *Mining activity*

Extensive mining activities have been carried out in the past by underground mining method.

Four upper seams viz. Seam XVIII, XVII, XVIA and XVI have already been exhausted. Seam XIV is being mined at present, also by underground method. As Seam XV is containing only Jhama, it has not been considered for mining in future. Therefore the future mining will be expanded to only the remaining two seams viz. Seam XVA and Seam XII.

The coal from the underground is brought to the surface by skips and unloaded into the pit head bunker. The coal from the pit head bunkers is transported to a central bigger bunker located at the starting point of the aerial ropeway. The coal from this

---

bunker is transported by aerial ropeway to the washery located at Chasnalla Colliery. This practice will continue in future also.

### **3.1 Type of project including interlinked and interdependent projects**

Jitpur Colliery is the captive mine of SAIL & for the captive use for their steel plants. Beneficiation of coal is carried out at an existing washery combinedly for Jitpur and Chasnalla Colliery. SAIL also plans to establish a new proposed washery with a capacity of 1.2 MTPA. The coal produced from the mine will be entirely used for the captive purpose.

### **3.2 Location with coordinates**

The Jitpur Colliery is located in the eastern part of the Jharia Coalfield. It is situated at about 15 km from Dhanbad Railway Station. The Jitpur mine concession lies between different Latitudes 23° 42' 32" to 23° 43' 14" N and Longitude: 86° 23' 05" to 86° 24' 14" E. It is covered by Survey of India Topo Sheet No. 73I/6 (RF1:50,000) of Survey of India.

### **3.3 Details of alternate sites & Environmental considerations**

Mining being site specific, no alternatives site is under consideration. Jitpur Colliery has been in operation prior to nationalization and operation is still continuing. Environmental considerations and protection measures assume greater importance for the project. M/s Steel Authority of India Ltd shall ensure that the proposed mine causes no adverse impact on the area. The proposed project is planned to meet all environmental norms and further improve the environs in the area.

#### **Diversion:**

There is no diversion of nallahs proposed and an embankment along the jore of 3m high above the HFL is provided for avoiding the entry of water into the low lying areas. This mine has been operational for over 6 decades and has been operating in an established manner. The mine has been operating by Underground method of mining. There are two no. of main drains in east and west of the property and connected to Karijore passing along the western boundary and finally confluence in the river Domodar.

### **3.4 Size or magnitude of operation**

The total extent of the mining lease area is 163.69 Ha. From the proposed lease area it is planned to mine a maximum of @ Nominal 0.6 MTPA/ Peak 0.7 MTPA of coal.

The life of mine presently proposed to be 23 years @ Nominal 0.6 MTPA/ Peak 0.7 MTPA (May be modified as per the Mining Plan which is under preparation).

---

### **3.5 Project description with process details**

Detailed exploration was conducted by drilling 21 exploratory bore holes in 1950s. Further, in 1959, five underground boreholes were drilled from the floor of Seam XVI.

The detailed geological investigations in the proposed mine have established the presence of 8 No. of coal seams.

Extensive mining activities have been carried out in the past by underground mining method.

Four upper seams viz. Seam XVIII, XVII, XVIA and XVI have already been exhausted. Seam XIV is being mined at present, also by underground method. As Seam XV is containing only Jhama, it has not been considered for mining in future. Therefore the future mining will be expanded to only the remaining two seams viz. Seam XVA and Seam XII.

A total of 19.33 MT of Geological reserves with Washery Grade-III are estimated considering available borehole data for the proposed virgin seams (XII & XVA seams) for extraction.

Out of 19.33MT of geological reserves, 16.59MT are mineable after deducting the loss of coal reserves due to Mine boundary, barrier against dykes etc., the net extractable reserves including trunks headings, after deducting losses due shaft pillar, drainage levels, technology and odd patches etc. comes to 8.09MT.

Besides, there is an operating seam (Seam XIV) which had 1.97 MT of extractable coal reserves as on 01-04-2009 (refer SCCL Project Report, page 9.2). As about 0.33 MT reserves have been extracted during the last 5 years, the balance reserves as on 01-04-2014 are about 1.64 MT.

### **SELECTION OF METHOD OF MINING**

#### **Background**

Already XVIII, XVII, XVIA, & XVI seams have been worked with total sand stowing. Presently, XIV seam below XVA seam having coal thickness of around 8m is being worked in 3 lifts with full stowing and this seam gets exhausted in the next few years. Above this is XV seam with average parting of around 45 m. This seam with average thickness of about 9 m. has been reportedly fully turned to Jhama and has been declared as totally unworkable. XVA is above XV seam with average parting of 49.7 m. It is now proposed to work XII seam coming just 76 m. (average) below XIV seam along with full stowing. And thereafter undertake development and extraction of thin < 2 m. XVA seam.

#### **Selection of underground mining technology**

1. It is proposed to extract XII seam by longwall retreating method in 2 or 3 lifts with hydraulic sand stowing due to the following factors:

- Average seam thickness is about 8.0m.
  - Considered degree of gassiness is degree - III.
  - Presence of surface features over the lease hold area.
-

- Overlying seams were extracted.
- More Conservation of coal due to absence of barrier in-between panels.
- Presently method of working is being practiced in XIV seam.

2. The XVA seam is proposed to be extracted by Bord & Pillar in conjunction with Hydraulic sand stowing due limited reserves and inconsistency in seam thickness.

### **OPTIONS FOR MAKING OVERALL BROAD STRATEGY FOR EXPLOITING THE BLOCK**

Presently XIV seam is the only working seam in Jitpur Colliery. It is being worked by conventional and semi-mechanised longwall method in conjunction with hydraulic sand stowing. The life of XIV seam is 15 years @ 0.135MTPA (as on 1-4-2009) with extractable reserves of about 1.97 Mt (As per Project Report by M/s SCCL). The present production from Jitpur Colliery is 300 t per day.

### **MINE ENTRY**

#### **i. Inclines (abandoned)**

Earlier three inclines were in use. But, presently these inclines are abandoned by sealing at the incline mouth.

#### **ii. Shafts**

Presently, the proposed Jitpur colliery has four working shafts. Total coal production is coming from XIV seam only. XIV seam has the access from surface through shafts namely J1, J3 and Noonudih shafts.

Shafts J1 and Noonudih shaft have been sunk up to seam XIV, while J3 has been sunk further up to seam XII.

The fourth shaft namely J2 is an upcast shaft which has been sunk up to XVI seam only.

### **MINING METHOD**

Presently, the XIV seam is being worked by longwall retreating method in conjunction with hydraulic sand stowing. The seam is about 9m thick. Development of the seam with road headers is completed. Steel arches with wooden lagging are the main support for galleries. The seam is being extracted in three slices from bottom to top.

The bottom most slice of 2.4m/ 2.6m thickness is being worked either by shearer (SERD) or by road heading machine with stowing.

---

### **(A) With shearer**

The shearer cuts a web of 0.6m for a height of 1.2m. Thus cutting height of 2.4m is achieved in two passes with ploughing in between the passes. Supports i.e., 40t Tubular Circular Ring (TCR) and link-bars are erected. After making six cuts i.e., advancing by 3.6m, boxings are erected at a distance of 2.4m from the new position of the face (or 3.6m from the old boxing line). After barricading and fitting of pipe lines, hydraulic sand stowing is done. The whole process is repeated again for the next cycle.

### **(B) With Road header:**

Two road headers, generally used for development are being used at longwall faces for the extraction of bottom lift of XIV seam. 2.6m high and 5.6m wide cut is made all along the face in strike direction by the road header in two passes. After every 5m of cut along the face, the roof is supported with roof bolts. Cuts in the second pass are supported by TCRs, steel chocks and wooden supports as necessary as temporary support. The coal cut by the road header is discharged onto the face conveyor and through the network of central gate belt and trunk belt conveyors, coal is transported outbye. Out of the span of 5.6m along the face, 4m width is boxed and barricaded for hydraulic sand stowing leaving 1.6m span free for placing face conveyor and stowing arrangement. Strata behavior is continuously monitored. This method was reported to be a successful method with no strata control problem.

### **Extraction of Middle and top sections by conventional longwall**

Extraction of Middle and top sections by the conventional longwall basically consists of drilling and blasting off the coal and loading of the blasted coal by manual loaders onto to the face conveyor.

This is done in two methods:

- The first one is that, after completion of bottom section completely in one panel, the middle section is opened from the central galleries of the bottom section and coal is extracted in middle and top lifts by blasting and manual loading on to AFC.
- The second method being simultaneous three lifts extraction, in which three lifts are worked simultaneously with a lag of 15m, in the sequence of bottom to top sections. This method allows the possibility of extraction without disturbing the strata due to longer time gaps.

The middle and top slices of 3m height each is being worked by conventional longwall over the stowed bottom slice and middle slice respectively and leaving the rest of the coal to support shaly roof of XIV seam.

### **SAND STOWING**

Hydraulic sand stowing is done in this mine by the two separate surface stowing arrangements. Two large capacity stowing arrangements are existing at J3 shaft and

---

Noonudih shaft. The above stowing arrangements are serving to fill the voids formed by extracting coal from block-14 to block-17 of XIV seam.

The stowing arrangement at J3 shaft has a pair of mixing vats from which two sets of pipe ranges enter the mine through this shaft for stowing. The stowing arrangement at Noonudih shaft has a single vat and a single stowing pipe range. These stowing arrangements operate in the H/L ratio ranging from 1:2 to 1:3 for different panels. Sand for stowing comes from Dongiri ghat.

## **MINE TRANSPORT**

In XIV Seam Coal from longwall face with shearer is loaded on to AFC by the shearer while that from longwall face with roadheader is mostly loaded on to the face chain conveyor by roadheader and the remaining spilled over coal is loaded manually.

Coal from conventional longwall face is loaded manually to the face chain conveyor. Coal from face chain conveyors is discharged onto central gate belt conveyors, which, in turn, load onto trunk belt conveyors. The extracted coal from blocks 14 to 17 is then conveyed by a series of trunk conveyors to the strata bunker in XIV seam. The capacity of this strata bunker is about 300 T. The coal from the strata bunker is loaded onto skips through a belt conveyor for bringing it to the surface.

If required, rope haulage with tubs is also used to evacuate the coal (manual loading to tubs) from the face which subsequently delivers the coal onto trunk belt conveyor through a tippler.

Material transport to the faces is done by a series of direct and endless haulages. Materials are lowered through the J3 shaft in cages.

## **MINE VENTILATION**

The mine is being ventilated by two main mechanical ventilators – one centrifugal type fan installed at fan drift connected to J2 shaft and the other of axial flow type fan installed at fan drift connected to J3 shaft.

The J1 and Noonudih shafts serve as main intake airways (down-cast shaft) while J2 and J3 shafts serve as main return airways (up-cast shaft) for the mine.

## **PUMPING**

Presently extraction of coal by stowing longwall is being carried out in XIV seam. The normal make of water in XIV seam is 1 m<sup>3</sup> per minute (17 LPS) and 7 m<sup>3</sup> per minute (117 LPS) during stowing.

The water from stowing faces as well as natural make of water in XIV seam flows down to dip most side of the mine and accumulates in the Dip sump of XIV seam. Presently two 600 GPM (45 US LPS) pumps are installed at this sump, in which one is in operation as the electric connection can be given to one pump at a time.

Water from dip sump is pumped to HT sump at the pit bottom level of XIV seam. Water from H.T. sump at XIV seam is pumped to XVI seam dip sump.

---

Water from XVI seam dip sump is pumped to XVI seam H.T. sump. Water from H.T. sump at XVI seam is discharged mainly to surface main reservoir, and partly to J3 stowing reservoir and mini stowing bunker reservoir.

From the main surface reservoir, water is pumped to stowing water reservoir at Noonudih, mini stowing bunker reservoir, DG set for cooling and to the filter plant for domestic supply. The pumping from the main reservoir is done by 4 numbers of pumps of total pumping capacity of 1600 GPM. The water to J3 reservoir flows from main reservoir by gravity.

### **Proposed Method of mining for extraction of XII and XVA seams**

Production enhancement at Jitpur colliery by extraction of XII and XVA seams at a rate of 2000 TPD is proposed.

Detailed descriptions of the mining methods are given below:

1. Longwall panel retreating by Low capacity Continuous Miner and 5cum Coal hauler (LHDs) with stowing, in two lifts by leaving parting of 1.0m thick coal in between lifts.

There is an evident example of Low cost Continuous Miner with 5.0 cum LHD/ Coal hauler combination working successfully at SECL on contract basis. It has been reported that a daily production of 1000t is possible by this method from one set of CM.

The necessary consideration in this option is the ground pressure exerted by the Continuous Miner. The low capacity Continuous Miner (CM) exerted a Ground pressure of 1.2Kg/cm<sup>2</sup>. A parting of 1.0m thick coal layer between lifts over stowed sand would be sufficient to bear ground pressure exerted by Continuous Miner. Care should be taken to ensure parting thickness between lifts by drilling at regular intervals. Loss of coal in panel barrier is minimum as there is no panel barrier in between adjacent panels. The percentage of extraction in the panel is about 84%.

This method offers advantages such as

- more ventilation due concentrated workings,
- mass production is possible due to mechanization
- loss of coal reserves in panel barriers is minimum due to stowing,
- low operating cost and high productivity due to mechanization
- Limited workings improve management control, supervision and safety in mining operations.

By considering the above, Longwall retreating by Low capacity Continuous Miner and 5cum LHDs with stowing, in two lifts by leaving parting of 1.0m thick coal in between lifts is considered as a technically feasible method for extraction of XII seam.

It is proposed to work XII seam by Longwall retreat method in conjunction with hydraulic sand stowing and XVA seam to work with Bord & Pillar method with hydraulic sand stowing by low height SDLs since this seam is very thin and inconsistent.

---

## **DEVELOPMENT OF SHAFT BOTTOM OF XII SEAM:**

The development at shaft bottom of XII seam will be taken up after completion of deepening of J-1 & Noonudih shafts and after completion of construction works at pit bottom like insets, skip loading etc. Connection will be established between J-1 and J-3 shafts for establishing ventilation which will be followed by development of trunk roadways to Noonudih shaft.

### **(A) METHOD OF WORKING OF XII SEAM**

The development and extraction is proposed as follows:

- i) Development of trunk roads, gate roads and interconnections by Continuous miner with LHDs.
- ii) Extraction of panels by Longwall with hydraulic sand stowing in two lifts.

### **(A.1) DEVELOPMENT OF TRUNK ROADWAYS BY CONTINUOUS MINER (CM)**

It is proposed to develop two trunk headings of XII seam initially from J-1 shaft to Noonudih shaft. This will enable faster connection between the two. A small bunker of 50-60 T will be commissioned near J-1 shaft for storage of coal when the skip is not available. Once the connection is established between J-1 and Noonudih shafts, Main Mechanical Ventilator will be commissioned at Noonudih shaft. By this time the Main Mechanical ventilator will be readily commissioned and ventilation System need to be reorganized in the whole mine including XIV seam (as explained in Ventilation Chapter). After re-organization of Ventilation, two CM will be deployed viz. One to drive the remaining three trunks from Noonudih to J-1 and the other CM to drive trunks from J-1 shaft area to dip sump and the galleries required for the dip sump. This CM will further develop the cross drainage galleries towards east and west from dip sump. Meanwhile the other CM will develop the trunks towards west side to reach Block-1.

It is proposed to develop the Trunk roadways in XII seam with 4.8m width and 3.6m height along the floor. A daily progress of 45m/1000 T is considered.

It is proposed to develop Trunk headings by using continuous miner with two LHD and one Roof bolting machine. The LHD will have a bottom discharge to enable to work in low heights. LHDs receive the mined coal from the continuous miner and transport it to feeder breaker. The coal is then transported through a series of trunk belts to the underground storage bunkers. The coal from underground storage bunker is transported to surface by skip. Total two CMs are envisaged for proposed drivages to match the required production. Auxiliary fans with ducting are also provided for face ventilation in all headings.

### **DEVELOPMENT OF GATE ROADWAYS BY CONTINUOUS MINER**

Because of single Gate roadways, it is proposed to develop a pair of roadways 50m apart simultaneously with inter-connections at 50m intervals from top trunk roadways ( Haulage & Belt) to bottom trunk roadways (Return & Drainage) to

---

facilitate the working of CM, better ventilation and safety. The dimension of Gate roads is 4.8m width X 3.6m height in XII seam. Gate road ways are proposed to be driven in full dip direction at a gradient, varying from 1 in 6.5 to 1 in 6.0.

## **EXTRACTION OF PANEL BY CONTINUOUS MINER IN TWO LIFTS**

### **Length and width of the Long wall Blocks**

Basic extraction layout is planned with Longwall layout only to increase the percentage of extraction. This method allows minimal losses in barriers and increases the life of the project.

The width of the Blocks has been decided keeping in view the length of cable of CM, LHDs & position of Feeder breaker and simultaneous extraction of lifts. Width of Blocks is planned to be 100m for working of CM. Length of the Blocks is planned to be 100m to 640m depending upon the available property. In this layout there is no barrier between the blocks as extraction is with hydraulic sand stowing and gate roads supported with yielding steel arches.

The face will be first prepared by driving a gallery along strike at distance 20m from bottom trunk road to form LW Face. This block of 95.2mX20m serves as barrier to protect the bottom trunk road. The face will be stowed by leaving a gap of 2.0m between the face and the stowed barricade. The CM will cut the face in passes of 8-10m with a width of 4.0m thus making the total span of the face to be 6.0m and then the CM will move to cut the other side of the face. The coal cut by CM will be carried by the LHD to discharge onto Feeder Breaker in the gate roadway. Once the CM vacates the first part of face, bolter will be deployed to support the roof. The length of the face is 100m.

Considering two lifts per Block and one CM serves for two blocks, initially two faces are available for one CM. After advancing the bottom lifts for a distance of 50m-75m, four faces will be available for one CM of which one face will be under stowing. Coal roof of part face in bottom lift is supported with GRP Bolts (glass reinforced plastic) of 1.8m length which are cuttable by CM during cutting in top lift.

Time taken to complete one slice of face ((100-4.8) m X4.0m) which require 10 cuts is 2days (considering 6 cuts per day). Then CM will move to next block for cutting. First face will be ready for stowing, barricade will be erected leaving two meters from face and stowed at rate of 150cum per hour, time 10 hours for 200mm HDPE one range, Time taken to complete the barricade & stowing of void 1370cum is two days with one stowing range of 200mm. However, one spare range is provided to complete the stowing in less than two days. Totally three stowing ranges are provided for two continuous miner panels.

After Bottom lifts of both the Blocks have advanced 50 -75m, then access roadways at 1 in 7 gradient will be made along the gate roadways in dip direction to enter the Top lift over the coal for which coal block of 4.8m width and 15m length is left in bottom lift. The distance between two lifts will be such as to match the cable length of CM. The access roadways shall be prepared in advance at every 50m interval.

---

Skelton development of roadways and LW face will be made in Top lift as made in bottom lift. Extraction in bottom lift and top lift of two blocks will be made simultaneously till the completion of both blocks such that at any time the horizontal distance between the two faces in one block will not be less than 20m so that front abutment pressures will act on solid coal and not on working face.

It is proposed to extract the bottom lift with 3.6m height and Top lift with 3.6m leaving 1m coal over the sand of bottom lift. However, depending on the practical condition, the parting coal may be increased to 2m between top lift and bottom lift for easy movement of the LHDs. The percentage of extraction from the block is 84% and the percentage of extraction from the XII seam is 49 % of mineable reserves of 14.71 Mt.

Thus one CM will have minimum two faces at any time, one for cutting and other for stowing. The maximum no. of faces available is four with two lifts for two blocks and one CM will work for two Blocks. So that 2CM will have 4 LW blocks having 8 faces. Time taken to cut one pass of 8-10m will be two hours.

Average time taken to march from one part of the face to the other is less than half an hour.

Time taken for roof bolting one part of face is 90min to 120min.

One CM can cut 2 cuts per shift, one cut produced coal is of 168T (9mX4.0mX3.6mX1.3) and 6 cuts per day thus a production of 1000 TPD is possible from one CM and with two CM, 2000 TPD is possible.

### **SUPPORTING**

The roof support in the LW block is by roof bolting of 1.9m length of full column resin grouted 20 - 22mm dia. roof bolts in 25 - 27 mm diameter drill holes at 1.2m intervals in one row and 1.0m interval between rows. This supporting will be done in all galleries including junction.

The roof in trunk roadways are supported by steel arches of yielding type at 1.2m interval as permanent support in addition to roof bolting as practiced in XIV seam.

The roof in gate roadways shall be supported by steel arches of yielding type at 0.6m interval in addition to roof bolting as practiced in XIV seam.

GRP (glass reinforced plastic) bolting is proposed in bottom lift during extraction of LW Block in bottom lift.

The methods and pattern of support for the roof and sides (SSR) is to be framed in consultation with equipment suppliers and scientific agencies and approval is to be obtained from DGMS accordingly

### **Development of trunk roadways by Side Discharge Loaders:**

It is proposed to develop the trunk headings and interconnections of XII seam by drilling, blasting and loading the coal by SDL. The dimension of the Trunk roadway is 4.8m wide and 3.6m height.

---

## **DEVELOPMENT OF GATE ROADWAYS BY SDL**

It is proposed to develop a pair of gate roadways one above other leaving parting of 3m from top trunk roadways (Haulage & Belt) to bottom trunk roadways(Return & Drainage) to facilitate better ventilation. As such one gate road along the floor and other is along the roof of XII seam. The proposed dimensions of gate roadways are 4.8m wide and 2.5m height. Access roadways will be made to drive the top gate roadway from Trunk roadways. Gradient of access roadways is planned to be 1 in 4.

### **(B) METHOD OF WORKING OF XVA SEAM**

It is proposed to extract XVA seam with bord and pillar mining in conjunction with hydraulic sand stowing. It is planned to develop the XVA seam from 15<sup>th</sup> year of the project after extraction of XIV seam.

#### **i. DEVELOPMENT OF TRUNKS**

Initially, Two/Three trunk roadways will be developed in XVA seam from J1 shaft to Noonudih shaft to establish return airway for XVI seam in 2<sup>nd</sup> year and convert J2 shaft from return to intake. The remaining four trunks will be developed in 15<sup>th</sup> year from Noonudih shaft to J-1 shaft. Later, development of trunks would be carried out from J-1 shaft to reach the dip side boundary and Sump will be developed. The Level galleries are planned slightly dipping out by for self-drainage of water.

#### **ii. SIZE OF PILLARS**

In view of semi-mechanization the pillar size are kept 50m X 50m, which satisfies the Coal mines Regulation 99. The size of roadways will be of 4.8m X 1.5m or full thickness of seam.

#### **iii. SUPPORT OF ROADWAYS**

The main function of support system in roadways is to keep in position the immediate roof. Suitable systematic support rules will be framed and the approval of DGMS will be obtained for the development of trunks, galleries and panels for the support of roof and sides. The roadways will be supported by roof bolting with w-straps fixed at an interval of 1.2m between bolts and 1.0m between rows. Wire mesh will be fixed wherever the roof is coal/shaly coal/carb coal and bolts shall be anchored in the strong roof. The length of the bolt will be not less than 1.5m.

However, detailed scientific investigations are to be carried out for formulating support plan for roadways, keeping in view the nature of the immediate roof.

Additional supports near fault planes and at geologically disturbed roof are to be provided, if required.

#### **iv. MONITORING OF SUPPORT SYSTEM**

The monitoring of roadways is very much essential for assessing the stability of roadways and for better strata management. The monitoring should start from the day

---

on which the driving of the roadway starts. Further, this monitoring is a statutory obligation on the part of mine operators. Hence provision for the following is provided in the project report.

- a) Convergence Indicator
- b) Tell tales
- c) Borehole Extensometers
- d) Load cells
- e) Stress cells etc.

#### **v. SIZE OF PANELS**

The Size of the panels has been decided keeping in view the incubation period of the coal seams and method of work. Each panel is so laid as to have overall dipping gradient out by towards trunk roadways to facilitate self-drainage of water.

#### **vi. EXTRACTION OF PANELS**

Level split of 4.8m width are proposed in each pillar. 4.7m wider dip slices with a rib of at least 2.0m between the slices will be driven and ribs will be extracted judiciously on retreat. After extraction of one dip slice, it would be stowed before start of new slice. The schematic layout is shown in Fig- 8.5.1

Diagonal line of face would be maintained while extracting pillars in the panels and also the stooks in the pillars. The percentage of extraction from the XVA seam is 48% of mineable reserves of 1.88 Mt

#### **vii. SUPPORT DESIGN FOR DEPILLARING PANEL**

The roof support in district is achieved by roof bolting of 1.2m length of full column cement grouted roof bolts of 20-22mm diameter in 25-27 mm diameter drill holes at 1.2m intervals in a row and 1.0m interval between rows. This supporting will be done in all galleries including splits/junction. However, in thin seam the length of bolt is to be selected based on the scientific study. The methods and pattern of support for the roof and sides (SSR) is to be framed in consultation with scientific agencies and approval is to be obtained from DGMS accordingly. Strata monitoring with Multipoint wire extensometer, convergence indicators and load cells etc. by scientific agencies is also proposed.

#### **vii. PRODUCTION CAPACITY OF SDL**

The production capacity of SDL is considered as 30000 tonnes per annum per SDL.

### **STUDY OF DIFFERENT OPTIONS TO OPTIMIZE DEVELOPMENT ACTIVITIES**

It is proposed to enhance the production of Jitpur colliery to 2000TPD from extraction of XII and XVA seams. However, to achieve above production from the selected seams, certain modifications are to be done to the existing shafts to provide following:

---

- Access to selected seams for extraction
- Required Ventilation to enhance production of mine from extraction of selected seams and
- Transport of men and material to the selected seams etc.,

The above modifications to existing shafts are studied under two options

### **Option-1**

- Noonudih shaft will be converted into a Return Air shaft after widening from diameter of 3.65m to 8.0m (finished dia.) and deepening upto and below XII seam, with coal winding for XVA, XIV and XII seams including services facilities such as Sand stowing, Power transmission and inspection & maintenance.
- J1 shaft will be used as Down Cast by deepening from XIV seam to XII seam and stabilization near the XIV seam.
- J3 shaft will be used as Down Cast shaft, and Man & material winding with double deck cages where 24 persons can travel at a time.

### **Option-2**

- Noonudih shaft will be used as Return Air shaft without coal winding but with service facilities such as Sand stowing, Power transmission and inspection & maintenance. However Noonudih shaft can be utilized as only return air shaft without coal winding and excluding service facilities such as Sand stowing, Power transmission and inspection & maintenance.
- J1 shaft will be used as Down Cast shaft by deepening upto XII seam with a high capacity new skip loading system (3000TPD) from XIV, XII and XVA seams.
- J3 shaft will be work as Down Cast and Man-winding Shaft with double deck cages where 24 persons can travel at a time.

### **Major demerits with Option-2:**

a) J1 shaft (presently, total production of Jitpur colliery coming from J1 shaft only) shall be kept idle for at least 12 months from the date of commissioning of following works such as

- The cleaning and dismantling of existing head gear and winding engine
- Preparation of new foundation for head gear and winding engine,
- Installation and commissioning of Headgear, winding engine (new) and skip loading and unloading systems etc.,

However deepening of the shaft shall be taken up without disturbing the existing system by providing an RCC plug (for separation)

By considering above, Option -1 is a most suitable alternative. Because of capital cost involved in the option-1 is less and continuation of present level production capacity upto commissioning of Noonudih Upcast shaft & J1 Down cast shaft after required modifications is possible.

---

## **DETAILED DESCRIPTION OF SELECTED OPTION (OPTION-1)**

### **i. Noonudih Shaft - related works**

The existing Noonudih Shaft is a down cast shaft up to XIV Seam (358.4m) with finished dia of 3.65m having insets at XVIII, XVII, XVIA, XVI and XIV Seams. At present, a single deck cage is provided for installation and maintenance of pipelines, cables etc., and also for inspection of the same. The cage is guided on ropes and a 150HP Single drum electric winding engine is provided to cater the needs of the above.

As per the ventilation study done by the Research and Development department of SCCL, the Noonudih Shaft has to be widened from 3.65m dia to 8.0m finished dia and shall be used as Return Air Shaft.

Further this shaft also needs to be deepened upto XII seam and further sunk upto /below XII seam for about 25 m to accommodate skip loading, spillage handling and to utilize as sump.

Before take up the work of widening and deepening of Noonudih Shaft, it has to be studied by a scientific organization

The entire shaft needs to be lined with M20 grade R.C.C monolithic. The required insets shall also be constructed at XVA & XII seams.

The Shaft shall be equipped with rigid guides and pipelines required for pumping and sand stowing ranges.

A new winding system with Headgear structure and coal unloading arrangements are to be provided. Further coal transportation from the surface coal bunker to Chasnalla Washery will continue to be done by Bi-Cable Aerial Ropeway.

The winding engine shall be either Thyristor driven or VFD, Floor mounted friction winder having a lifting capacity of 25 T (10 to 12 T capacity skip) at an average speed of around 10 m/Sec from a Depth of 700 m.

This involves a major re-organization of the shaft with widening, deepening and providing shaft fittings totally new.

In addition to the above, a new set of fully covered heavy duty Headgear with High capacity winding system, skip loading and unloading arrangements are to be provided.

The time required will be about 36 months.

The detailed scope of work involved for converting the existing shaft into Return Air shaft with coal evacuation by skip hoisting are mentioned below:

---

- Headgear – (Heavy duty) with total covering to make it air tight design, fabrication and erection– Approx. 180 Mt
- Design, fabrication and erection of Skip unloading arrangements – Approx. 10Mt
- Construction / refurbishing existing winding engine house with foundations etc.
- Installation (design, procurement) of new high capacity multi rope koepe (friction) winding engine.
- Airlock/ fan drift construction and commissioning.
- Construction and commissioning of Fan house.
- Ventilation Fan procurement, installation and commissioning.
- Widening of the shaft from its present dia of 3.65 M to (8.0M, finished) dia with RCC – M20 shaft lining up to XIV seam with construction of necessary insets (388m and shaft collar).
- Deepening of the existing shaft from XIV seam to XII seam (approx. 80m) up to 8.0m finished dia, including the depth required for skip loading arrangement, for spillage handling etc with RCC M20 lining.
- Skip loading arrangements at and below XII seam, XIV seam and XVA seam.
- Spillage drift construction connecting shaft sump to XII Seam.
- Shaft equipping with buttons, guide rails pipes and cables.
- Commissioning of skip hoisting.
- Dismantling of the existing system.
- Coal evacuation from the surface bunker.

## **ii. J1 Shaft-related works**

J1 Shaft is a Down cast shaft sunk up to XIV Seam, which is of 467.8m deep, 4.88m finished dia and having insets at XVIII, XVII, XVIA, XVI and XIV seams. Presently the total coal produced from the mine is evacuated through this shaft with skip hoisting system from XIV Seam. The skip winding is with a 750 HP Double drum GEC make winding engine with 7.5T capacity skip (Presently working with 6.0T Skip). The guides are equipped with rigid rail guides made of 60 lbs rails.

J1 shaft will be used as Downcast by deepening up to XII seam without skip winding. The works involved are:

- Deepening of the existing shaft from XIV seam to XII seam with RCC M20 lining throughout and preparing insets at XII and XVA seams.
  - Stabilization of shaft pillar in and around XIV seam (Between J1 and J3 shaft for about 13.5m span so as to consolidate the shaft pillar area).
  - Before take up of deepening the J1 shaft, it has to be studied by scientific organization.
-





an artificial RCC Plug can be constructed as a Protective plug as mentioned in Sr. No: 7 & 8).

7. Extend the co-ordinates and shaft center to the newly deepened shaft.

8. Construct a RCC plug just above the co-ordinate so as to protect the persons working underneath.

9. Normal sinking & muck disposal shall be done through the incline by means of skip arrangements.

10. Once the shaft sinking and equipping activities are completed, the plug is removed and such that the shaft is extended upto XII seam.

11. Any left out equipping, teething works etc shall be taken up completed in a week time.

### **GENERAL PARAMETERS OF JITPUR COLLIERY**

Presently Jitpur colliery has four working vertical shafts. They are J1, J2, J3 and Noonudih shaft. The working seam XIV has been accessed by three shafts, namely J1, J3 and Noonudih shafts. Shaft J1 and Noonudih shaft has been sunk up to seam XIV, while J3 has been sunk further upto seam XII. The fourth shaft namely J2 is an upcast shaft, which has been sunk up to XVI seam only.

It is proposed to approach the seams XII and XVA by existing three Shafts (J1,J3 and Noonudih). J3 shaft has access upto bottom most seam XII and is used for men and material transport. J1 shaft is proposed to deepen upto XII seam from XIV seam and used as downcast shaft. Noonudih shaft is proposed to widen from 3.65m to 8.0m and deepened from XIV seam to XII seam. Noonudih shaft is used as upcast shaft and for skip winding with 12 t capacity skip (proposed capacity of coal transport is 3000TPD). No alterations are proposed for J2 shaft. Presently J2 shaft is working as Upcast shaft. To bring J2 into downcast shaft, one tunnel of 163m length with 3m wide X 2.5m height is proposed from XVI seam to XVA seam. Two or three trunks are proposed to develop within XVA seam, from J1/J3 to Noonudih shaft to facilitate return air from XVI seam sumps via above said proposed tunnel.

The details Shafts after re-organisation are given below:

#### **THE DETAILS OF SHAFTS AFTER RE-ORGANISATION**

Shaft	Diameter (m)	Depth (m)	Purpose	Status
J1	4.88	537.85	Downcast shaft up to XII seam with an emergency man winding	Proposed for deepening upto XII seam
J3	4.88	534.65	Downcast shaft with Double deck cage winding (men and material) & stowing range	Already deepened up to XII seam

Noonudih	8.00	421.35	Upcast shaft with Coal winding from XII, XIV and XVA seams & for stowing ranges	Being widened & deepened up to XII seam
J2	4.88	279	Downcast shaft with single deck cage winding	No alteration

## MINE LAYOUT

Barrier of 50 m (25 m on either side) is provided for the mine boundary. The total coal extracted from XII, XIV and XVA seams are transported through a series of belt conveyors laid in respective seams, strata bunkers near Noonudih shaft and via Noonudih skip winding to surface. Noonudih shaft is the only shaft, proposed with skip winding (proposed skip capacity is 12T). Transport of material from surface to XII, XIV and XVA seams is through J3 shaft. Men transport is through the J3 shaft. Stowing ranges to XII seam and XVA seams are through J3 shaft and Noonudih shaft respectively.

## STORAGE OF COAL

Three underground strata Bunkers are proposed, one each in XII Seam, XIV seam and XVA Seam with a capacity of 1000 T, 200T & 200 T respectively, for storage of coal at Noonudih shaft. Strata bunkers will receive extracted coal from respective seams only and then convey to respective seam skip pockets at Noonudih shaft and finally through skip transport to surface bunker.

## MINE LAYOUT IN XII SEAM

As explained earlier, the mode of entry to XII seam is through J1, J3 and Noonudih shaft. Both J1 and J3 shafts act as intake air ways to the seam and return is through the Noonudih shaft.

Average thickness of XII seam is considered as 8.0m based on the data supplied by the Jitpur colliery management. The development of trunk roads and gate roads are proposed along the floor of the XII seam. Five trunk roadways are proposed in XII seam to accommodate haulage for material transport, belt for coal transport, stowing ranges for stowing and to provide sufficient ventilation at working places. The trunk roadways are proposed with 4.8m width x 3.6m height to allow very high air quantities required for degree-III gassy mine at permitted velocities.

Further, as the trunk roadways with all required inter connections are proposed to be driven with Continuous miner.

Generally, the face length for the Longwall panels is planned at 100m for Continuous Miner.

The gradient and orientation of panels is selected based on the floor contours. Further, the layout of the mine is designed to maximize coal extraction and minimize development activities.

The trunk roadways are proposed with a gradient of 1 in 6.5 and the gradient of gate roadways is varies from 1 in 6.5 to 1 in 6.8. The Longwall panels are planned to

---

extract from dip rise direction to facilitate the efficacy of stowing. Proposed Longwall panels are extracted without panel barrier between adjacent panels.

Mine lay out for seam XII are proposed to extract in two lifts with Continuous Miner by leaving 1m coal parting between two lifts.

The coal transport is through series of belt conveyors up to strata bunker of 1000T capacity provided in XII seam. The coal is then conveyed to the surface through the Noonudih skip winding. The material transport from surface to XII seam is through J3 shaft and from shaft bottom to working panels by series of haulers. The men transport is through the J3 downcast shaft.

Two sumps are envisaged in XII seam, one in the dip most area of the property and the other near J1 shaft (in shaft pillar). Water thus collected from dip sump will be conveyed through pipes to the main sump in XII seam. From main sump in XII seam to main sump in XVI seam through J1 & J3 shafts.

### **MINE LAYOUT IN XVA SEAM**

The XVA seam is planned to be extracted in 15th year of the project after completion of XIV seam. The mode of entry to XVA seam is similar to XII seam through shafts. Both these J1 and J3 shafts act as intake air ways to the seam and return is through the Noonudih shaft.

A tunnel of 163m length of cross section 3.0m wide and 2.5m height is proposed from XVA seam to XVI seam in view to convert J2 shaft (Upcast shaft) as Downcast. For conversion of J2 as downcast shaft , initially two/three trunks are proposed to be driven in 3<sup>rd</sup> year of the project in XVA seam from J1 shaft to Noonudih shaft so that return air from XVI seam passes to Noonudih shaft through XVA seam by the proposed return tunnel(163m).

Average thickness of XVA seam varies from 0.9m to 1.8m based on the data provided by Jitpur colliery management. It is proposed to extract the XVA seam (where seam thickness is more than 1.25m) with Bord and Pillar method of mining in conjunction with hydraulic sand stowing.

The remaining three/four main trunk roadways with inter connections are planned to be driven from Noonudih shaft to J1/J3 shafts. Later these trunks will be driven up to the dip side mine boundary and sump will be made by driving galleries and thereafter the panels will be developed from mine boundary followed by depillaring with stowing. The size of galleries will be 4.8m wide and full seam height so as to reduce the resistance to ventilation and also to accommodate proper clearances for gear heads and associated belt section. Out of these six trunk roadways, three trunks will be utilized for return airways and other three trunk roadways for belt, manway and haulage.

The coal and material transport is achieved through series of belt conveyors and haulers.

Water collected in XVA seam sumps is conveyed through the shafts to the main sump at the XVI seam.

---

## **SUPPORT DESIGN FOR TRUNK ROADWAYS, GATE ROADWAYS & DEVELOPMENT WORKINGS.**

The trunk roadways and gate roads in XII seam will be supported by 20 - 22mm dia roof bolts of length not less than 1.9m during drivage. The resin bolts will be placed in a pattern of 5 bolts per row with a row interval of 1.0m. Later these Trunk roadways and gate roadways will be supported with steel yielding steel arches with laggings at interval of 1.2m and 0.6m respectively as practiced in presently working XIV seam.

The roof support in XVA seam is achieved by roof bolting of 1.5 m length of full column resin grouted 20 - 22mm dia. roof bolts with channels / W-straps .These bolts will be placed at 1.0m intervals in one row and 1.0m interval between rows. This supporting will be done in all galleries including splits / junction. Further at places where there are geological disturbances, 200mm x 100mm girders will be erected additionally.

However, study physico-mechanical properties of roof rock in selected seams and advice of scientific agency may be sought for designing the support system.

### **SUPPORT DESIGN FOR DEPILLARING PANEL**

The roof support in Access roads and middle gate roads shall be made with 40T hydraulic props (open circuit type) at 1.2m interval. If necessary, girders of 150mmX75mm would be laid over the OC props.

#### **Seam XII (by Continuous Miner in two lifts)**

The roof in **bottom lift** will be supported with Glass Reinforced fiber bolts(cutttable bolts) of 1.9m length of full column resin grouted 20-22mm diameter roof bolts, in 25- 27 mm diameter drill holes at 1.0m interval in row and 1.2m interval between the rows.

The roof in **top lift** will be supported with roof bolts of 1.9m length of full column resin grouted 20-22mm diameter roof bolts, in 25-27 mm diameter drill holes at 1.0m interval in row and 1.2m interval between the rows.

#### **Seam XVA (by SDLs)**

The roof in XVA seam will be supported with roof bolts of 1.5m length of full column resin grouted 20-22mm diameter roof bolts, in 25-27 mm diameter drill holes at 1.2m grid pattern.

The methods and pattern of support for the roof and sides (SSR) is to be framed in consultation with equipment suppliers and scientific agencies and approval is to be obtained from DGMS accordingly

### **Monitoring of supports**

The monitoring of roof in trunk roadways, gate roadways and depillaring workings is very much essential for assessing the stability of workings and for better strata control/management. Strata management plan should be prepared in consultation with scientific agencies. General strata monitoring instruments are given below.

---

- a) Convergence Indicator
- b) Tell tales
- c) Borehole Extensometers
- d) Load cells
- e) Stress cells etc.

## **BLASTING**

Presently, the mine has been working with four vertical shafts. The working Seam XIV has been accessed by three shafts, namely J1, J3 and Noonidih shafts. Shaft J1 and Noonidih shaft has been sunk up to Seam XIV, while J3 has been sunk further up to seam XII. The fourth shaft namely J2 is an upcast shaft which has been sunk up to XVI seam only.

J1 shaft is proposed for deepening upto XII seam and Noonidih shaft is being widened & deepened up to XII seam.

A tunnel of 163m length of cross section 3.0m wide and 2.5m height is proposed from XVA seam to XVI seam in view to convert J2 shaft (Upcast shaft) as Downcast. For conversion of J2 as downcast shaft, initially two/three trunks are proposed to be driven in 3<sup>rd</sup> year of the project in XVA seam from J1 shaft to Noonidih shaft so that return air from XVI Seam passes to Noonidih shaft through XVA seam by the proposed return tunnel(163m).

Blasting will be required for sinking the shaft as well as the development of a tunnel/trunk roads and gate roads, proposed along the floor of the XII Seam for which permitted explosives will have to be used and stored. Explosives will also be required.

The coal winning is planned mainly by application of Continuous Miners in Seam XII and Low height Side Discharge Loaders (SDLs).

There are two magazines with a total capacity of 6600 kg of explosives.

### **3.6 Raw material required along with estimated quantity, likely source, marketing area of final product's Mode of transport of raw material and Finished product**

Raw Material Required along with estimated quantity/annum:

Explosives (T) – Approx. 100 Te, purchasing from Explosive companies

Diesel Oil (KL) – 0.02 KLD, purchasing from Oil companies

Mode of Transportation of Raw Material:

· Diesel oil is being transported to Company Established Oil Bunks at Chasnalla site through approved Oil Company Lorries and from thereon it is being taken in small quantity to Jitpur as per requirement.

#### ***Coal Transportation***

Further coal transportation from the surface coal bunker to Chasnalla Washery will continue to be done by Bi-Cable Aerial Ropeway.

---

### **3.7 Resource optimization/ recycling and reuse envisaged in the project**

During construction, emissions are fugitive in nature due to excavation for surface facilities, soil handling, levelling and similar activities. The content of the emissions is predominantly SPM, for which dust mask shall be provided to the workers. Water sprinkling will be done on roads, excavation sites etc to reduce fugitive emissions. There will be some emission due to burning of fossil fuel in construction machinery.

The resources which are used in the mining will be recycled by various methods. Sludge generated from domestic wastewater treatment will be composted and used as manure. Spent oil from transformers, machines, vehicles & DG sets generated periodically, will be sold to the authorized vendors. Mine water shall be discharged through adequate number of pumps (as required) and shall be used for mining activity.

### **3.8 Availability of water its source, energy / power requirement and source**

#### **3.8.1 Water**

Underground mine water is utilized for industrial uses like hydraulic sand stowing, dust suppression, firefighting, road watering etc. Presently extraction of coal by stowing longwall is being carried out in XIV seam. The normal make of water in XIV seam is 1 m<sup>3</sup> per minute (17 LPS) and 7 m<sup>3</sup> per minute (117 LPS) during stowing. In XII seam avg daily make of water is calculated to be 90 LPS.

Consumption: Domestic- 1110 KLD

Industrial- 400 KLD

Sources :

Domestic-MADA (Mineral Area Development Authority)

Industrial-U/g Mine pit water

#### **3.8.2 Power**

All equipment proposed for this project, are electrically operated. Mine power requirement is for u/g mine operation, lighting, workshop, pumping etc.

Power is supplied to the Jitpur colliery through 33kV o/head line from Putki Grid s/station via BSEB Bulihari s/station of DVC. Overall max demand for the project works out to 4.8 MVA for a targeted production of @ Nominal 0.6 MTPA/ Peak 0.7 MTPA. Existing 33 kV Jamadoba s/station with additional power requirement of 1x 6MVA, 33/11kV transformer is proposed for this project. Approx. 0.02 KL/D fuel (diesel) will be consumed.

### **3.9 Quantity of wastes to be generated (liquid and solid) and scheme for their management / disposal**

Solid waste in the form of waste rock, associated shales, etc. from mining activity would be very less since it is underground mining. The solid waste generated from the proposed project:

---

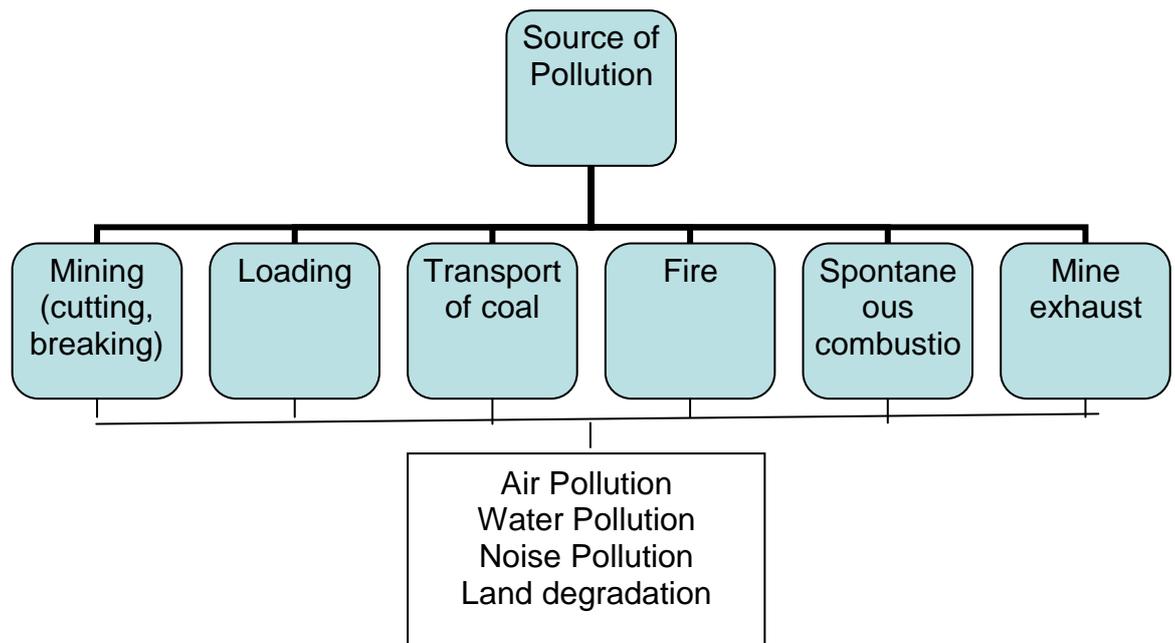
- (i) While shaft deepening of existing shafts
- (ii) While driving tunnels in hard rock wherever required.

The solid waste produced during drivage of tunnels and air shaft deepening will be used for blanketing of subsidence areas, filling of low lying areas, construction of embankment, etc.

Garbage / wastes collected from the township shall be disposed in the designated landfill areas. Sludge from Sewage and Effluent will be used for land leveling.

**3.10 Schematic representations of the feasibility drawing which give information of EIA purpose**

Schematic diagram showing the activities involved in the existing project which are potential source for Air Pollution, Water Pollution, Noise, Land degradation and impact on other environmental attributes are given under:



**4.0 SITE ANALYSIS**

**4.1 Connectivity**

**Road**

Jitpur Colliery is well connected by metal road with district head quarter Dhanbad. It is located at 15Km south of Dhanbad by road. The Fertilizer Corporation of India’s (FCI) Sindri complex and Burnpur works of IISCO are at about 19 km and 95 km by road respectively.

**Rail Link**

Bhaga Railway station is the nearest railway station which is at a distance of 2.5 km from the mine.

### *Air Link*

The nearest airport Ranchi is situated at 161 Km south–west from Dhanbad.

#### **4.2 Land form, Land use and land ownership**

The lease area of the project is covered with Nallahs, roads, aerial rope ways, township, office buildings, Transmission Lines, Telephone lines, Sand stock yard, sand stowing bunkers, water reservoir, etc.

The area is mostly barren & agricultural, except the residential areas where some plants and vegetation are grown. Scattered patches of land are used for cultivation.

Ownership breakup of the Lease Area of Mine is as follows:

i) Company Land (SAIL) = 26.37 Ha

(Acquired/ Purchased/ Transferred)

ii) Govt. Land/ Private Land = 137.32 Ha

iii) Forest - Nil

Total = 163.69 Ha (Lease Area of Mine)

#### **4.3 Topography**

Surface of the lease hold area at Jitpur Colliery slopes slightly from north to south direction. The highest and lowest contours in the area are 177m & 158m respectively.

#### **4.4 Existing land use pattern**

There are no National parks, wild life sanctuary within 15 km radius. The drainage pattern over the proposed area is from North to South, all the rain water is being drained out through two drains flowing over east and west of the property and connected to Karijore which further meets Damodar river. The jore is on the dip side boundary of the property.

#### **4.5 Existing infrastructure**

The site services required already exist at the mine within the premises of mine complex. Most of the area under reference is developed with surface constructions of Colliery Complex including the residential buildings for the colliery employees, Office buildings, pit-top constructions etc.

As the mine is already operational, the workshop complex comprises lathe, drilling, welding and other electrical and hydraulic equipment for repairs and overhauling of road headers, continuous miners, shuttle cars, LHD etc, and also includes an open yard for parking of vehicles and facility for hydraulic testing etc.

The area is also connected by a network of power lines. The aerial ropeway for transportation of coal from Jitpur Colliery of SAIL to Chasnalla Washery also exists in the area.

---

## 4.6 Soil classification

The soils of these areas have developed over granitic–gneiss, occurring on upland, gently sloping with undulating surrounding country land. These soils are fine loamy to fine textured and red to yellowish red to greyish in colour. These soils have moderate erosion. The soils are characterised by moderately acidic to neutral in nature, low organic carbon status, deficient in nitrogen and phosphorous, medium potassium content with medium available water holding capacity.

## 4.7 Climatic data from secondary sources

### (i) *Climate*

Dhanbad district experiences sub-tropical climate, which is characterized by hot summer from March to May and well distributed rainfall during southwest monsoon from June to September. The south-west monsoons bring about 80 to 85% of annual rainfall. Winter season in the area is marked by dry and cold weather with intermittent showers during the month of December to February.

The post monsoon season comprises of October and November while December transitions into winter. The fall in temperature is upto 5 deg C. Clear bright sky with occasional rain during January and February are observed in this season. The summer season prevails from March to June with gradual increase in temperature and moisture. The temperature rises as high as 48 degree centigrade. Afternoon thunder storm is frequently observed causing poor visibility in May. From later half of the month of June the rainy season starts and it ends in September. The south-west monsoon brings about the major precipitation. Dhanbad/Jharia area is climatically different from neighboring regions. Dhanbad/Jharia area receives more rainfall due to coal dust, which attracts clouds and brings rainfall to the area.

### (ii) *Long term meteorology*

Long term meteorological data of Dhanbad has been taken from the “Climatological Normals” (1961-1990) issued by IMD Pune.

The data in respect of various parameters are discussed briefly in the following paragraphs.

#### *i. Temperature*

As per the monthly average of daily maximum and minimum temperatures for the period 1961 to 1990 at IMD Station for Dhanbad, the monthly mean of minimum temperatures ranges from 6.7°C in January to 21.3°C in July. The monthly mean of maximum temperature ranges from 28.9°C in December to 43.4°C in May.

#### *ii. Rainfall*

The average annual rainfall for the year 1961 to 1990 was 1484.6 mm. The monsoon season is spread over the months from June to September.

---

### *iii. Humidity*

As per the relative humidity data for 8:30 hrs and 17:30 hrs taken for IMD, Dhanbad from the “Climatological Normals” (1961-1990), it is seen that relative humidity is higher during the period of monsoon and lower during other months. The average relative humidity is 69% in the morning and 56 % in the evening. are presented in Table 10.4.

### *iv. Wind flow pattern*

The wind data from 1961-1990 has been analyzed. From perusal of the morning data, it is follows that the predominant wind directions are generally north-west in January to March and November & December. The predominant wind directions are generally south-east in April to October. Mostly, the wind speed varies from 1 to 19 kmph and significant amount of calm.

## **4.8 Social infrastructure available**

Hospitals, school, community facilities are present in the villages in the core zone as well as in buffer zone within 10 Km of study area.

## **5.0 PLANNING BRIEF**

### **5.1 Planning Concept**

Jitpur Colliery of Collieries Division, M/s Steel Authority of India Ltd is has been in operation prior to nationalization and operation is still continuing for supplying coal for captive use of its steel plants. The company takes care of production, management and mining operations. The occurrence of economically mineable coal seam has been well known in the Jharia coal field over the country.

### **5.2 Population projection**

Large number of local personnel including land losers has been mostly recruited in unskilled, semi skilled office assistant categories etc. The employment of local people in primary and secondary sectors of project has upgraded the prosperity of the region.

The following socio-economic benefits have been ushered in the area by the mining activity.

- Conservation of precious coking coal
  - Direct and indirect employment opportunities.
  - Improvement in the trade and commerce as a result of the improved cash flows.
  - Further improvement of infrastructure facilities.
  - Improvement in the greenery due to plantation programmes by the mine authorities
  - Drinking water supply improvement.
-

- The occupational pattern of the people has changed for the better and support services created and will create further employment and growth opportunities.

### **5.3 Land use planning (break up along with green belt etc.)**

As this project is an underground project hence virtually no land degradation will take place.

### **5.4 Assessment of infrastructure demand (physical & social)**

Complete facilities near the site are very important for coal production. It is imperative to develop core infrastructure like power, road, telecommunication, housing, service buildings viz. office, store, first aid centre, canteen, etc. for a large number of employees for the project. The mine project is at 15 Km south of Dhanbad Railway Station.

The site services required already exist at the mine within the premises of mine complex as it is already an operational mine. Jitpur Colliery is well connected by metal road with district head quarter Dhanbad. It is located at 15Km south of Dhanbad by road. Bhaga Railway station is the nearest railway station which is at a distance of 2.5 km from the mine. The state capital Ranchi is situated at 161 Km south –west from Dhanbad.

### **5.5 Amenities / facilities**

Hospitals, school, community facilities are present in the villages in buffer zone within 10 Km of study area. The Mines Office, Workshop, Garage & other ancillaries already exists. The First Aid Room, Rest Shelters, Toilets, Tool /Store Rooms etc have been provided at mine site.

## **6.0 PROPOSED INFRASTRUCTURE**

### **6.1 Industrial area (processing area)**

As the mine is already operational, the infrastructure like workshop complex, coal handling plant, haulage room, store, workshop, fan house, substation etc. already exists. The existing office buildings, workshops and CHP facilities are adequate for producing and dispatching the enhanced production of the project under proposal.

There are two magazines (one is of 5.6 tonnes capacity another is of 1000kg capacity) are provided away from the pit-head within Jitpur block boundary, which will take care of the requirement of explosives and accessories for drivage of drifts or any other headings where blasting may be required.

The targeted production of @ Nominal 0.6 MTPA/ Peak 0.7 MTPA is envisaged by extraction of XII and XVA Seams in two options with the following equipment.

In option-1: extraction of XII seam is proposed by 2 No. of low capacity Continuous Miners, in two lifts by leaving 1m coal parting between lifts.

In option-2: extraction of XII seam is proposed by 8 No. of SDLs in three lifts without leaving coal parting between lifts.

For above two options, extraction of XVA seam with 4 No. of SDLs is common.

---

## XII SEAM EQUIPMENT

### OPTION-I

Details of number of equipments and accessories required in the project are presented below.

#### A) CONTINUOUS MINERS UNIT AND ACCESSARIES

Sl. No.	DESCRIPTION	No. of Units
1	MC 255 Continuous Miner (Steep Gradient Machine) ,width of 2.7m and Operating Voltage 1100V, 3 Phase, 50 C/S Complete with all Accessories	2
2	912CH Coal Hauler/ LHD 5 cum capacity Operating Voltage 550V, 3 Phase, 50 C/S Complete with all Accessories	4
3	Feeder Breaker 200 TPH Capacity Operating Voltage 550V, 3 Phase, 50 C/S Complete with all Accessories	2
4	Roof Bolter DM110	2
5	Electrical and Signaling Equipment complete with Transwitch unit,	2
	Gate end boxes, Cables, etc.	
6	Roof bolting, installation and commissioning consumables, and spares for the above	LS
7	Auxiliary fan 25 Cum/S, 120mm WG, 50KW complete with electricals	3
8	Hydraulic power packs	4
9	40T OC Hydraulic props	880
10	Ventilation ducting 900 mm dia.(Km)	1

#### B) BELT CONVEYORS

Sl.No.	DESCRIPTION	No. of Units
<b>Development Belts</b>		
1	125kW ,1000mm Type-6 conveyor complete with drive & structure	2
2	55kW ,1000mm Type-6 conveyor complete with drive & structure	1
3	30kW ,1000mm Type-6 conveyor complete with drive & structure	5
<b>Gate Belts</b>		
4	125kW ,1000mm Type-6 conveyor complete with drive & structure	2
<b>Trunk Belts</b>		
5	125kW ,1200mm Type-6 conveyor complete with drive & structure	6
6	55kW ,1200mm Type-6 conveyor complete with drive & structure	3

**OPTION-II****A) SDLs and ACCESSORIES**

Sl. No.	DESCRIPTION	No of units
1	611 Model Electrically operated Low Height Side Discharge Loader, 1.1 Cu.m Bucket Capacity	8
2	Pneumatic Bolters	10
3	Air compressors	4
4	FLP Drill control panels (550/125v) with plug and socket provision with drill cable FTD-3 type IS :14494 & dill machine	14
5	Medium duty, armoured chain conveyor, model PF-Iv500,200TPH, 2x45kw, 150m length complete, with FLP 2X45Kw Drive head and motors	6
6	Armoured Chain Conveyors 1x30KW, 50m length	4
7	Pony Conveyors, 100m length, 800mm width, 22KW complete with electricals Belt(Type 3), m	6
8	Hydraulic power packs	2
9	OC props 40T, 3.0m/2.1m	1450
10	1m Rams for pushing AFC	20
11	Aux. Fan, 15cu.m/Sec., 150mm WG, 35KW complete with electricals	6
12	900mm dia., Semi rigid flexible ducting,(Km)	2

**B) BELT CONVEYORS**

Sl.No.	DESCRIPTION	No. of Units
<b>Development Belts</b>		
1	30kW ,1000mm Type-6 conveyor complete with drive & structure	3
<b>Gate Belts</b>		
2	125kW ,1000mm Type-6 conveyor complete with drive & structure	3
3	55kW ,1200mm Type-6 conveyor complete with drive & structure	1
<b>Trunk Belts</b>		
4	125kW ,1200mm Type-6 conveyor complete with drive & structure	6
5	55kW ,1200mm Type-6 conveyor complete with drive & structure	3

### C) MATERIAL TRANSPORT – HAULERS

SI. No.	DESCRIPTION	No of Units
1	75kW Direct Hauler complete with electricals	2
2	30KW Direct Hauler complete with electricals	4
3	45KW Endless Hauler complete with electricals	3

### D) PUMPING & DRAINAGE

SI. No.	DESCRIPTION	No of Units
1	Main Pumps 75 Litres per Second, 300m head 310 KW complete with electricals in XII seam	3
2	Dip Pumps,75 Litres per second, 100m head, 110KW complete with electrical in XII seam	3
3	Dip Pumps 60 Litres per Second, 50m head 35 KW complete with electrical in XVI seam	5
4	Main Pumps 75 Litres per Second, 300m head 310 KW complete with electricals in XVI seam	3
5	Slush Pumps, 28LPS, 28m head,37KW complete with electrical in XII Seam	2
6	Face pumps/Bucket pumps 5KW	8

## 12.3 XVA SEAM EQUIPMENT

### A) SDLs and ACCESSARIES

SI. No.	DESCRIPTION	No of units
1	Electrically operated Low Height Side Discharge Loader, 1.1 Cu.m Bucket Capacity 41KW	4
2	Pony Conveyors, 100m length, 800mm width, 22KW complete with electricals Belt(Type 3)	4
3	Drill Control Panels with Drill machines 1.1kW	14
4	Aux. Fan, 5cu.m/Sec., 200mm WG, 15KW complete with electricals	6
5	600mm dia., Semi rigid flexible ducting,(Km)	1.2

---

**B) BELT CONVEYORS**

SI.No.	DESCRIPTION	No. of Units
1	125kW ,1000mm Type-6 conveyor complete with drive & structure	3
2	55kW ,1000mm Type-6conveyor complete with drive & structure	3
3	30kW ,1000mm Type-6conveyor complete with drive & structure	2

**C) MATERIAL TRANSPORT – HAULERS**

SI. No	DESCRIPTION	No of Units
1	75kW Direct Hauler complete with electricals	3
2	30KW Direct Hauler complete with electricals	4
3	45KW Endless Hauler complete with electricals	3

**D) PUMPING & DRAINAGE**

SI. No.	DESCRIPTION	No of Units
1	Pumps 250 GPM, 75m head 55 KW complete with electrical in XVA seam	4
2	Face pumps/Bucket pumps 5KW	4

**E) VENTILATION**

Main mechanical ventilator, 135-165mm WG, 800KW including standby  
- 2 No.

**F) WINDER AND SHAFT FITTINGS**

820 KW Winder with 3.3 KV electricals 1 No.

**6.2 Residential area (non processing area)**

No additional township is required for the envisaged proposal. The existing township is sufficient to cater the needs of persons employed in this Project.

**6.3 Green belt**

Green belt has been developed around CHP, mine-colony interface etc., to dampen the noise. Further green belt along the periphery of the facility area shall be developed keeping in view the environmental problems.

**6.4 Social infrastructure**

As the mine is already operational, social infrastructure for the villages in & around the mine like permanent roads, bore wells, drinking water facilities, power line, telephone line etc already exists. Social Infrastructure available in the area will cater the needs of the employees working in the mine. No additional social infrastructure is proposed in the project.

---

## **6.5 Connectivity**

Connectivity is already covered in para 4.1.

## **6.6 Drinking Water management (source & supply of water)**

Drinking water is supplied from MADA (Mineral Area Development Authority) and distributed through pipe lines to different facilities for drinking and domestic purposes.

Water requirement: Domestic- 1110 KLD

## **6.7 Sewerage system & industrial waste management**

The chances of the water quality getting affected due to mining activity are very remote, as no chemical having toxic element is used in carrying out mining activity. Mining is carried out by underground method. Also, neither soil nor coal contains toxic elements, which can affect the quality of the water. Sewage from colony is treated in septic tank and soak pits system. Run-off water from mine facilities area as well as pumped out mine water is led to settling ponds.

## **6.8 Solid waste management Mine**

Solid waste in the form of waste rock, associated shales etc from mining activity would be very less since it is underground mining.

## **6.9 Power requirement & supply / source**

Already covered in Para 3.8.2.

## **7.0 REHABILITATION AND RESETTLEMENT PLAN**

As it is an existing mine, most of the area under reference is developed with surface constructions of colliery complex and no R&R is involved.

## **8.0 PROJECT SCHEDULE & COST ESTIMATES**

### **8.1 Project schedule**

The project under the proposal is an operating mine and it is proposed to enhance its capacity to @ Nominal 0.60 MTPA/ Peak 0.7 MTPA. Life of the mine is 23 years as per the Project Report by M/s SCCL.

### **8.2 Cost Estimate**

Rs. 222.69 crores (July 2010 price level) is the proposed capital requirement of the project for expansion of capacity to @ Nominal 0.60 MTPA/ Peak 0.7 MTPA (As per Project Report by SCCL-Option-1 continuous miner).

---

## 9.0 ANALYSIS OF PROPOSAL (FINAL RECOMMENDATIONS)

This is an existing underground mine of proposed capacity @ Nominal 0.60 MTPA/ Peak 0.7 MTPA, and the extent of mine is 163.69 Ha.

Since it is underground mining, therefore the environmental impacts will be minimum.

The following physical infrastructure facilities will further be improved due to capacity expansion of the existing Project:

- Road Transport facilities
- Communications
- Housing facilities
- Water supply and sanitation
- Power
- Medical, Educational and social benefits will be made available to the nearby civilian population in addition to the workmen employed in the project.

### **Improvement in Social Infrastructure**

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

The following changes in socio-economic status are expected to take place with this project.

- i) The project is having a strong positive employment and income effect, both direct as well as indirect.
- ii) The project is going to have positive impact on consumption behavior by way of raising average consumption and income through multiplier effect.
- iii) People perceive that the coal mining projects help in the development of social infrastructures / such as.

- Education facilities
- Banking facilities
- Post offices and Communication facilities
- Medical facilities
- Recreation facilities
- Business establishments & Community facilities
- Plantation and parks

### **Other Tangible Benefits**

The Expansion project is likely to have other tangible benefits as given below:

- Indirect employment opportunities to local people in contractual works like housing construction, transportation, sanitation, for supply of goods and services to the project and other community services.
  - Additional housing demand for rental accommodation will increase.
  - Market and business establishment facilities will also increase.
  - Cultural, recreation and aesthetic facilities will also improve.
-

- Improvement in communication, transport, education, community development and medical facilities.
- Overall change in employment and income opportunity.
- The State Government will also benefit directly from the proposed project, through increased revenue from royalties, excise duty and etc.

**Justification**

- The development of coalfield will provide better social and economic life to the area. It will also give a boost to the industrial activity in the area and help in creating national wealth.
  - In order to meet the ever increasing coal demand, it is essential to at least maintain the approved rated production.
-