

## **PRE-FEASIBILITY REPORT OF KARGALI OCP**

### **1.1 BACKGROUND OF THE PROJECT**

Kargali OCP is located in East Bokaro Coalfield of Central Coalfields Limited. The mine lies in the east of Bokaro OCP and north Gomoh- Barkakana branchline running east-west. The project is in the administrative control of B&K area of Central Coalfields limited, Ranchi. Kargali colliery is a very old and taken over mine. The mine has been extensively worked out and the balance reserve in the proposed project area of 198.90 Ha. is 3.00 MTe only.

### **1.2 LOCATION**

Kargali OCP is located in east central part of East Bokaro Coalfield of Central Coalfields Limited in Jharkhand state. The area falls within latitude 23° 46' 00" and 23° 46' 23" N and longitude 85° 58' 55" and 85° 59' 56" E and covered under Topo Sheet of 73-I/2.

### **1.3 BRIEF GEOLOGY**

The area lies on the northern limb of main synclinal basin of the east Bokaro Coalfields. Blocks of lower barakar and karharbari formation represented by coarse to medium grained sandstone with thick coal seams are preserved in the Kargali colliery area.

#### **1.3.1 Sequence of Coal Seams and Partings within the proposed area:**

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**Table-1.1** Seam Sequence

<b>Seam Name</b>	<b>Thickness Range (meter)</b>	
	<b>From</b>	<b>To</b>
Kathara	2.0	3.7
Parting	6.00	12
Uchitdih	0.3	0.6
Parting	6.00	12.00
Uchitdih A	0.6	1.1
Parting	31	41
Kargali Seam	22	24
Parting	30	73
Bermo Seam	10	15

Parting	35	58
Seam XI	2.00	3.5
Parting	14	25
Seam X	12.0	15
Parting	0.6	6
Seam IX	0.3	1.5
Parting	15	33
Seam VIII	26.0	35.0
Parting	2	12
Seam VII/VI	12	16
Parting	30	40
Seam V	1.4	2.0
Parting	14	20
Seam IV	0.2	1.0
Parting	4	8.0
Seam III	0.4	1.66
Parting	33	68

### 1.3.2 Structural Setting within proposed area:

The block is located in the northern limb of main synclinal basin of the east Bokaro Coalfields and is situated on the upthrown side of the Govindpur Pichri Fault.

#### 1.3.2.1 Dip and Strike:

The general strike of the formation in Kargali Bazar area is almost east west. The dip of the formation is towards south and the amount varies from 6 deg to 8 deg in Kargali bazar area.

#### 1.3.2.2 Fault Description:

The geological structure of the entire area has been proved by the underground workings of kathara and kargali seams. The area is free from any major faults. However, based on the borehole records of CMED 4, a fault running almost north south with 10-20 mtr throw towards east has been interpreted.

### 1.4 PRESENT PROPOSAL (OBJECTIVE)

The Pre-Feasibility Report for working in Kargali colliery has been prepared in the project area of 198.90 Ha. within the Kargali colliery. The balance mineable reserve as on 31.03.2018 is estimated as 3.00 MTe within the proposed project area of 198.90 Ha.

## 1.5 MINE BOUNDARY

The proposed working area under FPR is restricted from all sides. In the North, it is limited due to large scale settlement and Kargali washery. The southern part of the proposed working quarry area has already been extensively worked out in different seams and filled up with considerable amount of water and reclaimed with OB and Plantation. The western part is bounded by Bokaro Colliery and South west by River Damodar.

## 1.6 MINEABLE RESERVES

The mineable reserves in the quarry have been estimated as 3.00 MTY and the total volume of OB as 8.00 Mm<sup>3</sup>. The average stripping ratio works out to 2.67m<sup>3</sup>/te.

### 1.6.1 CALENDAR PROGRAMME OF EXCAVATION

The mining schedule has been formulated based upon the adopted sequence of mine development. For making the section wise calendar programme of excavation; the reserves of coal and volume of OB have been calculated in different sectors or horizons.

**Table-1.2:** Summarised Calendar Programme of Excavation

YEARS OF OPERATION	1	2	3	4	5	TOTAL
COAL (Mte)	0.50	0.50	0.50	0.75	0.75	3.00
OB (M cum)	1.33	1.33	1.33	2.00	2.00	8.00

### 1.6.2 STRIPPING RATIO AND LIFE

**Table-1.3:** Stripping Ratio & Life

Particulars	Combined
Coal ( Mte)	3.00
OBR including rehandling (Mcum)	8.00
Stripping Ratio (Cum/te)	2.67
Life (Years)	5

## 1.7 LAND DETAILS

Total area proposed is 198.91 Ha. The land use is enclosed in the plates.

## 1.8 SAFETY MEASURES

### 1.8.1 SAFETY ASPECT OF WORKMEN & HEMM

Special precaution should be taken while deploying workers in the mine. Before employing any labour to the mine proper vocation training should be imparted and recommendations of VIII Safety Conference should be strictly followed. Some of the major aspects are as follows:-

#### A) FOR PERSONS

- i) No persons shall be deployed unless he is trained at VTC
- ii) Records in Form-B Form-D shall be maintained.
- iii) Records of Vocational training Certificate and driving license of operators shall be kept by competent authority and shall be made readily available for inspection by management.
- iv) No person shall be employed unless person holds VTC. A record of it shall be maintained.
- v) Adequate supervision shall be maintained by qualified competent persons only.

#### B) FOR MACHINERIES

Provisions of Coal Mines Regulation and DGMS Cir. (Tech.) 1 of 1999 should be strictly adhered to along with the following:

- i) All machinery and plant used in connection with working of a mine shall be of good design, sound construction, and suitable material, adequate strength, free from patent defect and properly maintained.
- ii) The owner, agent and manager shall provide adequate training facilities and ensure proper training of persons employed for operation and maintenance of machinery and plant.
- iii) No person except an engineer or other competent person under his supervision shall undertake any work on machinery and plant in which technical knowledge or experience is required.
- iv) All the machineries to be deployed in mines shall be so designed as to afford the operator clear and uninterrupted vision all around.
- v) Every heavy earth moving machineries, including trucks and tippers, used in mine shall be fitted with adequate safety features or devices as specified by DGMS. All equipment shall be provided with audiovisual alarms, proper light for use at night and fitted with suitable type of the fire extinguishers.

- vi) Truck mounted drill machines designed for tube well drilling for sources of water shall not be used and only proper type of blast hole drill machine, especially designed for mining purpose, shall be used in the mine.
- vii) Every heavy earth moving machinery shall be under the charge of a competent person (Operator or Driver), authorized in writing by the Manager.
- viii) All persons employed or to be employed to operate heavy earth moving machinery shall be trained and their competency shall be evaluated by a Board constituted by the management, who shall be persons who are not connected with imparting of training.
- ix) A proper record of repair and maintenance along with inspection done by competent authority and defect pointed out shall be maintained and signed by authorized person.
- x) Only such fitters or mechanics possessing driver's or operator's license, shall be allowed to carry out test-run of heavy earth moving machineries.
- xi) No person other than the operator or the driver or any person so authorized in writing by the manager shall be allowed to ride on a heavy earth moving machinery

### **1.8.2 STABILITY OF BENCHES, QUARRY HIGHWALLS & SPOIL DUMPS**

During quarry operations, it is necessary to adopt required mining parameters for the stability of benches, highwalls and spoil dumps. It is also mandatory to examine systematically the fencing of mine workings, landslides and cracks between benches. It is required to maintain well-graded and wide roads on benches keeping the width of working areas sufficient for spreading of blasted rock and movement of the mining and transport equipment.

During actual mining operation, systematic observations of the condition of benches, high wall slopes and spoil dumps should be carried out and the dimensions be modified if necessary to suit the local conditions. To ascertain the optimum slope angles for stability of quarry benches, highwalls and spoil dumps, scientific study of slope stability along with hydro-geological study of the area needs to be undertaken. Provisions laid down under Coal Mines regulation shall be strictly adhered to for the safety of quarry and OB/ spoil dumps. In addition to this, the following precaution should be considered:

- i) The spoil dump height should not exceed 90m from immediate surface level with an overall slope of  $28^{\circ}$  or less. In the event of encountering steep floor gradient, floor blasting should be done and the area properly levelled by dozer before spoil dumping.
- ii) No working or construction should be allowed within the 60m toe of the OB dump.
- iii) Before dumping the OB on the floor of seam, at least 10m length all along the strike length should be made horizontal at every 50 meter by floor dinting/blasting.

- iv) Dump should be created in such a way that there is no chance of accumulation of water in and around the base of dump as it will adversely affect the shear strength of the base material of dump. It must be ensured that there is no stagnant water at the toe of dump and the top of the dump.
- v) The toe and face of the dump should not be eroded or cut at any point of time to avoid slope failure.
- vi) Formation of dumping should be done in square or circular or any regular shape as far as possible.
- vii) Proper drainage system should be provided to bring down rain water by construction of inclined drain on dump face and catch drain on all benches.
- viii) During active period of dump, all rain water should be diverted away from mining site as far as possible.
- ix) Sump and pumping capacity should be sufficient to accommodate peak surface run-off and seepage of water.
- x) Gabion wall and garland drain should be constructed and maintained to trap the surface run-off and sludge coming from dump.
- xi) Plantation and grassing should be done on top and slope of the dump respectively.
- xii) Regular monitoring is required for development of tension crack, gullies, movement of soil mass, stagnation of water and any other unusual occurrence. In case of dump movement, rate of movement of dump should be monitored. Special attention should be given at curve area/turning area of the dump.

### **1.8.3 OTHER PRECAUTIONS AND SAFETY MEASURES IN SPOIL DUMPING**

With increasing size of opencast mine, the quantity of OB removal is also increasing. The dumping of OB can be external, internal or both. The stability of spoil dump is the main concern for an opencast mine. Poor management of overburden dump results the instability of dump slope in opencast mine. In few decades destabilizations especially internal dumps have taken place in coal mines, therefore, it has become necessary to adopt the scientific methodology for spoil dumping along with the following statutory steps / measures.

- a) The width of any bench in waste dumps shall not be less than its height and a scientific study is to be made, in case the planned height of the dump is beyond 30m.
- b) In case of any existence of any road nearby, dumping shall be done in such a way that the distance between the toe of the dump and road is not less than twice the overall

dump height. If it is inevitable, arrangement shall be made for diversion of road; so that it is away from the stated safe distance.

- c) The top soil and sludge shall not be dumped at the floor to create the base of the dump.
- d) For reducing the ground water pressure in the dump rock above phreatic surface, effective drainage system shall be provided both inside and outside the overburden dump. In this regard, the guidelines provided in DGMS Circular (Tech) No-2 of 2001 in designing pit slope shall be followed.
- e) The dump area shall be substantially fenced, in accordance with the CMR, to prevent inadvertent entry of any person to the dump.
- f) Precautions shall be taken to prevent spontaneous heating and fire in the carbonaceous shale and coal dumped along with overburden.
- g) Gabion walls, wherever required shall be provided round the periphery of dump for prevention of floor heaving and to facilitate the drainage of water accumulated near toe of external dump. It also acts as retaining wall to some extent.
- h) Internal dumping on the seam floor having steeper gradient shall not be carried out unless, it is ensured that the dump stability factor of safety is well within the allowable range. For this a scientific study on slope stability of dump considering the geo-engineering/mining parameters must be carried out and dumping shall be done in accordance with guidelines as suggested in the study report.

In addition to the above precautions and measures, it is also necessary to comply the statutory guidelines issued by DGMS or any statutory/safety bodies from time to time regarding OB dumping in opencast mines.

#### **1.8.4 PRECAUTIONS AGAINST DANGER OF INUNDATION**

Following are the precautions required to be taken against danger of inundation from surface water and old waterlogged underground workings:

- a) Adequate protection against any danger of inrush of surface water into the mine or part shall be provided and maintained to the satisfaction of DGMS, whose decision shall be final.

- b) The entrance into the mine shall be so designed, constructed and maintained that its lowest point (which means the point at which a body of rising water on surface can enter the mine) shall not be less than 3.0 meters above the highest flood level at that point.
- c) Every year, during the rains constant watch shall be kept on the flood levels on the surface of the mine and if at any time the levels cross the highest levels earlier recorded, such levels shall be marked by permanent posts along the edges of water and the new highest levels thus observed shall be recorded with the date as the highest flood level on the plans by an actual survey.
- d) If water dams or reservoirs are built across rivers and water courses on the upstream side of the mine, arrangements shall be made for communication between appropriate authorities for the purpose of ascertaining the quantity and timing of water released from the dams which is likely to endanger safety of the mine and arrangement for similar communication shall be made when water level rises on the upstream side which is likely to endanger the mine.
- e) The highest flood levels and danger levels at least 1.2 meters below the highest flood level, shall be permanently marked at appropriate places on the surface and whenever water rises towards the danger level at any place, all persons shall be withdrawn from the mine sufficiently in advance and for this purpose adequate arrangements of quick communication to all parts of the mine by effective systems shall be provided and maintained.
- f) A competent person shall, once at least in every fourteen days during the rainy season and once at least in every thirty days during other periods of the year, examine every protective measure provided under Regulations-149, whether in use or not, for their stability, and a report of every such examination shall be recorded. The protective measures and workings shall also be inspected, once at least in every quarter by the Manager personally.
- g) A careful assessment is to be made against the danger from surface water before the onset of rainy season. The necessary precautions should be clearly laid down and implemented. A garland drain needs to be provided to drain away the surface rainwater from coming into the mine.
- h) Kargali mine has been extensively worked out by underground as well as open cast method. Water retained in the developed or depillared underground bord & pillar workings may be released suddenly due to blasting or outburst under excessive water pressure (head), due to level difference or trapped water body, causing inundation. It is therefore,



necessary to take necessary precaution while approaching near underground waterlogged workings. Therefore, it is proposed that:

- (a) The surface boundary of proposed working sections should always be kept maintained at least 60m from old waterlogged underground and opencast workings.
- (b) In case, any symptoms of abnormal seepage of water is observed in the proposed working area, dewatering of existing developed or depillared mine workings and old quarries connected to such UG workings should be carried out keeping the mine workings / operations stopped till stoppage of seepage of water or the water level gets lowered to the safe limit.
- (c) Necessary precautions against danger of inundation as laid down in CMR 1957 and DGMS circulars shall also be adhered too.
- k) Standing order for withdrawal of working persons in case of apprehended danger. During heavy rain inspection of vulnerable points is essential. In case of any danger persons are to be withdrawn to safer places.

#### **1.8.5 PROTECTION OF EQUIPMENT DEPLOYED AT BOTTOM HORIZONS FROM FLOODING**

During the heavy monsoon period, the mining operation in the lower-most bench may have to be stopped. Therefore, it is proposed to drown the lower-most bench, which would work as a sump. The water will be pumped out and discharged into the nearby Nallah / River.

For ensuring safety of the equipment while working out bottom horizons with no access to surface profile, the following measures should be taken:

- (a) Drivage of initial trenches if any and coal cutting on bottom benches should be done during the dry period of the year.
- (b) Ramps should be made for quick shifting of equipment from bottom horizons, liable to be flooded during monsoon period, to the top horizons.

#### **1.8.6 PRECAUTIONS AGAINST DANGER FROM BLASTING**

Following measures should be taken while drilling and blasting operations in the quarry:

- a) Drilling and Blasting in quarry should be done in accordance with the provisions of Mines Safety Act, rules and regulations.
- b) Adequate safety measures have to be taken during blasting operation in the quarry so that men / machine are not affected.

- c) Blasting pattern and area to be blasted should be carefully evolved for best results and the blasted coal should be loaded as early as possible.
- d) Controlled or muffled blasting will be practiced near the important surface infrastructures and also within 100m of the vacant land. Besides this, necessary safety precautions should be clearly laid down and implemented whenever, any important surface features like public roads, rail, civil infrastructures / buildings etc. fall within radius of the blasting zone.

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