

PRE-FEASIBILITY REPORT
FOR
BASANTPUR-TAPIN COKING COAL WASHERY (4.0 MTY)
HAZARIBAGH AREA, CENTRAL COALFIELDS LIMITED

AUGUST 2018

Regional Institute-3
CMPDIL
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1. BACKGROUND

CCL intends to set up a coking coal washery with raw coal linkage from Tapin North OCP, Tapin South OCP, Parej East OCP and Jharkhand OCP on Build-Own-Operate (BOO) concept. The raw coal throughput of the washery will be 4.0 Mtpa. The expected monthly average ash content of Raw Coal is around 33.4% on 'adb' (air dried basis) and likely to vary within the range of 31.7 to 35.2% on 'adb'.

The washery will be designed to produce three products viz. washed/ clean coal, washed coal (power) & rejects.

Projection of yield has been done on the basis of the test results of 4 number of seams viz. IV/V, VA, VII and VIIA/VIIB (combined) of Tapin North OCP conducted by CIMFR. The composite raw coal ash of Seam IV/ V (combined) & Seam VA, Seam VII, Seam VII A/VII B (combined) contribution of which are 33.8%, 27.4%, 25%, 40.7% respectively, works out to 31.725%. Hence, the average ash of raw coal feed to washery has been considered as 31.725%.

2. LOCATION

The proposed washery will be located in the vicinity of existing Kedla Washery of CCL in West Bokaro Coalfield, Hazaribagh Area, District- Ramgarh, State Jharkhand.

3. COMMUNICATION

The proposed site for washery is well connected by road and rail. This site is approachable through a 20 km long metalled road from Ghato and connecting NH-33 at Charhi. NH-33 connects Ranchi and Hazaribagh. Another approach is through a 13 km all weather road connecting Gidi washery and crossing NH-33 at Kuju. Nearest Railway Station is at Danae on the Gomoh Barkakana loop line, 8 kms. east of Kedla Block and is also connected by a fair weather road.

The nearest Airport connected by daily commercial flights is at Ranchi.

4. TOPOGRAPHY & DRAINAGE

The general topography of the area is undulating, broken by small hills, the elevation varying from 324m to 382 m above MSL. The drainage is by easterly flowing Bokaro river on the south and Chutua Nala, a tributary of Bokaro River on the North.

5. CLIMATE

The area experiences an extreme climate with mercury dipping to 4°C in winter (December – January) and rising upto 46°C during summer (May-June). The annual rainfall varies from 1132 mm to 1748 mm, most of which occurs during rainy season (June-August).

6. LAND REQUIREMENT

For construction of the washery and temporary storage of reject, 32.47ha land which includes 8 Ha identified as reject storage site. The land is tenancy in nature. There is no forest land involved.

7. OBJECTIVE

Basantpur-Tapin Coking Coal washery of 4.0 Mty capacity will supply washed coal with 33.5±0.5% ash to thermal power stations.

8. RAW COAL LINKAGE TO THE PROPOSED WASHERY

Raw coal linkage to the proposed Basantpur-Tapin Coking Coal Washery is from Tapin North OCP, Tapin South OCP, Parej East OCP and Jharkhand OCP. The minewise and seamwise mineable reserves as on 01.04.2017 of these mines are given below-

Mineable Reserves

| Mine | Mt |
|--------------|---------------|
| Tapin North | 29.27 |
| Tapin South | 39.43 |
| Parej East | 73.11 |
| Jharkhand | 6.59 |
| Total | 148.40 |

As mentioned earlier, raw coal requirement for the proposed coking coal washery will be met from VIIC, VIIIA, VIII, VIIB, VIIA, VII, VI, VA, IV/V, V, III, II and O as given in table below.

Seam II is the major contributing seam, contributing about 26.47of mineable reserves.

| Seam | Tapin North | Tapin South | Parej East | Jharkhand | Total | % contribution |
|------|-------------|-------------|------------|-----------|-------|----------------|
| VIIC | | 1.29 | | | 1.29 | 0.87 |

| | | | | | | |
|-------|-------|-------|-------|------|-------|-------|
| VIIIA | | 1.20 | | | 1.20 | 0.81 |
| VIII | 24.00 | 2.46 | | | 26.46 | 17.83 |
| VIIIB | | 2.92 | | | 2.92 | 1.97 |
| VIIA | | 1.43 | | | 1.43 | 0.96 |
| VII | 5.27 | 5.12 | 1.99 | | 12.38 | 8.34 |
| VI | | 0.99 | | | 0.99 | 0.67 |
| VA | | 8.27 | 3.20 | | 11.47 | 7.73 |
| IV/V | | 10.26 | 10.54 | 0.99 | 21.79 | 14.68 |
| V | | 0.97 | 7.62 | 1.64 | 10.23 | 6.89 |
| III | | | 6.10 | 3.96 | 10.06 | 6.78 |
| II | | 4,52 | 34.76 | | 39.28 | 26.47 |

| | | | | | | |
|-------|--------------|--------------|--------------|-------------|---------------|---------------|
| O | | | 8.90 | | 8.90 | 6.00 |
| TOTAL | 29.27 | 39.43 | 73.11 | 6.69 | 148.40 | 100.00 |

9. UNIT OPERATIONS-

- **Coal Washing Methods**

The various procedures are broadly classified as the ‘Wet’ ‘and Dry’ processes. The dry process doesn’t involve the use of water, where as in the wet process, the water is the main medium for washing and jigging. The washery will be operated on wet process. The different processes involved in the washery are given below;

Crushing

Purpose of the crushing is to reduce the Run of Mine (ROM) coal to a size suitable for washing and, size reduction involving various principles such as compression, impact, shearing, splitting and attrition.

Primary crusher(s) are generally designed to receive ROM coal and reduce it to a top size of 2” to 8”

Secondary crushers are generally designed to reduce the size (to a top size of 1 ¾”) of the middling fraction from jigs or the middling fraction from heavy – medium trough separators, and, in turn these fractions would be rewashed. Crushing of as received coal sample (rom coal size) down to -13mm size is proposed.

- **Screening**

Sizing is the separation of a heterogeneous mixture of particle sizes into groups wherein all particles range between a maximum and minimum size.

Screens Used in Coal Preparation:

1. Scalping screen – for separating refuse and fines prior to size reduction
2. Raw coal sizing screen- for separating the raw coal into coarse and fine size for further processing.
3. Pre-wet screen- to remove fines prior to the mechanical cleaning

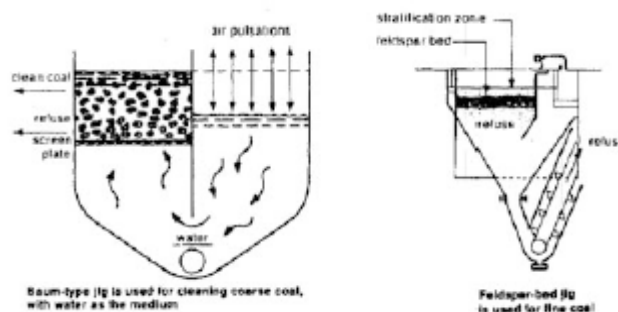
4. Heavy media recovery screens- for recovery and reuse of magnetite
5. Desliming screens-to remove extreme fines; and
6. Dewatering screens-to remove water.

- **Jigs**

Jigs operate by differences in specific gravity and rely on stratification in a bed of coal when the carrying water is pulsed. The shale tends to sink, and the cleaner coal rises. The basic jig is suitable for larger feed sizes. Although the Baum jig can clean a wide range of coal sizes, it is most effective at 10-35 mm. A modification of the Baum jig is the Batac jig, which is used for cleaning fine coals. The coal is stratified by bubbling air directly through the coal-water-refuse mixture in this cleaning unit.

For intermediate sizes the same principles are applied, although the pulsing may be from the side or from under the bed. In addition, a bed of hard dense mineral is used to enhance the stratification and prevent remixing. The mineral is usually feldspar, consisting of lumps of silicates of about 60mm size.

Jigs offer cost effective technology with a clean coal yield of 75-85% at about 34% ash content. The jigs are used more frequently than dense-medium vessels because of their larger capacities and cheaper costs.



Baum Jig and Fledspar Jig

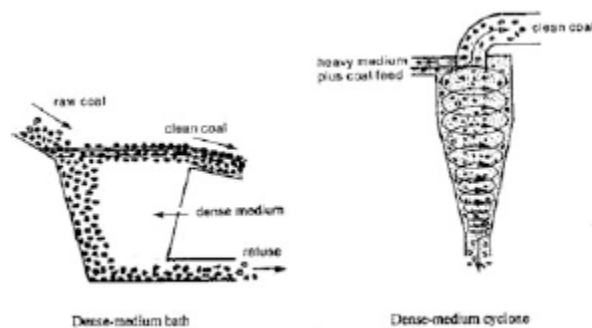
- **Dense Media Separator**

Dense-medium vessels also operate by specific gravity difference; however rather than using water as the separation medium, a suspension of magnetite and water is used. This suspension has a specific gravity between that of coal and the refuse and a better separation can be obtained. The slurry of fine magnetite in water can achieve relative densities up to about 1.8. Different types of vessels are used for dense-

medium separators such as baths, cyclones and cylindrical centrifugal separators. For larger particle sizes, various kinds of baths are used, but these require a substantial quantity of dense- medium, and therefore of magnetite. For smaller sizes, cyclones are used where the residence time is short and throughput relatively high. Cylindrical centrifugal separators are used for coarse and intermediate coal.

Dense-medium cyclones clean coal by accelerating the dense-medium, coal and refuse by centrifugal force. The coal exits the cyclones from the top and the refuse from the bottom. Better separation of smaller-sized coals can be achieved by this method.

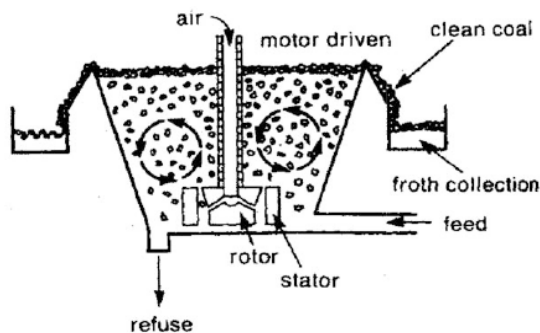
Key factors in the operation of any dense-medium system based on magnetite are the control equipment and the efficiency of magnetic recovery for recycle.



Dense Media Separator

- **Froth Flotation**

Froth flotation is the most widely used method for cleaning fines. Froth flotation cells utilize the difference in surface characteristics of coal and refuse to clean ultra fine coal. The coal-water mixture is conditioned with chemical reagents so that air bubbles will adhere only to the coal and float it to the top, while the refuse particles sink. Air is bubble dup through the slurry in the cell and clean coal is collected in the froth that forms the top.



Froth Flotation

- Transportation of rejects to Temporary Reject Storage Site by belt conveyer.
- Provision of closed water circuit with zero effluent discharge has been envisaged.

10. BALANCE OF PRODUCTS

Washed coal / clean coal is having yield% of 37.9 with ash% of 18.0. Washed coal (power) is having yield% of 24.7 with ash% of 34.0. Rejects is having yield% of 37.4 with ash% of 49.6. Therefore, total yield % is 100 and ash % is 33.8.

11. ENVIRONMENTAL POLLUTION MITIGATION MEASURES

The project related activities may have some impact on environment in study area in order to take care of the same, appropriate mitigation measures are recommended below.

Mitigation Measures for Air Quality

i) Coal crushing

This is a source of dust generation it is proposed to cover the crusher with enclosure. A dust extraction system would be provided to collect all dust generated during the crushing operation. The dust should be collected in bags. Subsequently these collected bags would be disposed off appropriately.

ii) Road Transport

Coal transportation by road is likely to be a major source for generation of particulate matter. In order to mitigate the impact of this, following recommendations are given:

- a. Blacktopping** - The transport road is to be blacktopped. This measure would lead to low generation of dust from road.
- b. Wet transportation by Tippers**- Raw coal will be transported by tippers in wet condition. This will facilitate in minimizing dust generation and spillage.

- c. **Green Belt along Road-** Project will plant three rows of plants on both sides of the road. This will serve as wind shelter that will help in minimizing the generation of dust from road.

iii) Coal Handling Plant (CHP)

- a) **Raw Coal storage-** A ground bunker would be provided in raw coal yard for storage of raw coal before crushing. A Water Sprinkling system would be installed for wetting the coal stock on ground. This will minimize dust generation from the exposed coal mass.

b) Belt Conveyor

1) the belt will be covered on top and both sides by sheet cladding. These arrangements will protect the coal mass moving on belt from blowing wind. In this way the dust generation would be minimized.

2) Water Sprinkling system on all transfer points will be provided in CHP.

Water Pollution Control Measures

(A) Effluent Source

The sources of effluent generation in washery plant complex are-

- **Industrial Effluent**

The proposed washery will have zero discharge, however, during heavy storms, storm water may be contaminated

- **Municipal Effluent**

The washery will have some service buildings including office, canteen, rest shelter etc. these will house facilities for drinking Water and wash rooms. Municipal effluents will be generated from these facilities.

(B) Mitigation Measures

In order to treat above effluents, following arrangements are recommended.

(a) Industrial effluent

Storm water drains will be provided will carry storm water into ponds in series . One set of ponds will be for treatment of effluent, second set for drying and third set for cleaning.

In addition, there will be one pond to store treated Water. Treated Water will be recycled for use as process water.

(b) Municipal Effluent

Keeping in view that volume of municipal effluent is low, it is proposed to provide septic tank and soak pit for its treatment.

Noise Pollution Control Measures

The following measures shall be taken:

- Proper designing of plant & machinery by providing in-built mechanisms like silencers, mufflers and enclosures for noise generating parts and shock absorbing pads at the foundation of vibrating equipment.
- Routine maintenance of equipment.
- Rational deployment of noise generating plant and machinery.
- Greenbelts around the infrastructure sites and service building area besides avenue plantation on both sides of the roads
- Personal protective devices to all the persons working in high noise areas.
- Regular monitoring of noise levels at various points.

12. ENVIRONMENTAL MONITORING PRORAMME

(A) Parameters to be Monitored

Following parameters will be monitored

► Ambient Air Quality

- (i) GSR-742 E dated 25.09.2000 on work zone.
- (ii) For other: GSR-826 E dated 16.11.09 (NAA QS)
 - Respirable Particulate Matter (RPM)
 - Suspended Particulate Matter (SPM)
 - Sulphur Dioxide (SO₂)
 - Oxides of Nitrogen (NoX)

► **Waste Water**

Waste water will be monitored as per parameters given in MoEF standards for Effluents. The coal washery will maintain the close circuit operation with zero effluent discharge. In case of periodic cleaning heavy rainfall etc., GSR 7, dated 27.12.1998, shall be complied.

► **Ground Water**

Ground water will be tested for parameters covered under BIS 10500: (1991).

► **Surface Water**

Surface water will be monitored for parameters as per BIS 2296:1982

► **Noise Level**

Ambient noise level will be monitored in db(A) limit in accordance with MoEF, GOI notification dated 26.12.1989, vide GSR 1063 (E) the ambient noise level standard for different categories.

13. The proposed budget for environmental management is given below

A. CAPITAL ESTIMATE

| | | |
|-------|--|------------------------|
| | Air Pollution Control | |
| (i) | Dust Control Equipments in Coal Crusher House | Rs. 20.00 Lakh |
| (ii) | Dust Controls Measures for ground raw coal storage / Water sprinkling, Enclosures etc. | Rs. 10.00 Lakh |
| (iii) | Dust Control Measures for CHP | Rs. 5.00 Lakh |
| (iv) | Water Sprinklers | Rs. 40.00 Lakh |
| (v) | Green Belt | Rs. 15.00 Lakh |
| (vi) | Road Widening & Black Topping | Rs. 50.00 Lakh |
| | Sub-Total | Rs. 140.00 Lakh |
| | Water Pollution Control | |
| (i) | Washery effluent Treatment Facility | Rs. 25.00 Lakh |
| (ii) | Municipal effluent treatment plant | Rs. 5.00 Lakh |
| | Sub-Total | Rs. 30.00 Lakh |
| | Grand Total | Rs. 170.00 Lakh |

B. REVENUE BUDGET ESTIMATE

| | | |
|-------|---|-----------------------|
| (i) | Repair & Maintenance cost of Environment Mitigation equipments. | Rs. 10.00 Lakh |
| (ii) | Operational Cost of Environment Mitigation equipments. | Rs. 30.00 Lakh |
| (iii) | Env. Monitoring Cost | Rs. 10.00 Lakh |
| | Total | Rs. 50.00 Lakh |

SUMMARISED DATA

1. Capacity & Operating conditions
 - a) Annual : 4.0 MTY
 - b) Daily : 12000 tonnes

2. Raw coal linkage : Tapin North OCP, Tapin South OCP, Parej East OCP and Jharkhand OCP

3. Construction period : 18 months
4. Life of the washery after commissioning for computation of economics (in years) : 18
5. Quality of raw coal feed (average)
 - a) Ash% : 33.4

6. Balance of Products :

| Product | Yield% | Ash% |
|------------------------|---------------|-------------|
| Washed coal/clean coal | 37.9 | 18.0 |
| Washed coal (power) | 24.7 | 34.0 |
| Rejects | 37.4 | 49.6 |
| Total | 100.0 | 33.8 |

7 Broad initial capital investment (Rs. in Crores) : 360

8 Construction period including trial run, PGT & commissioning 18 months

9. Other details :

a) Water Source of water for operation of the washery is mine water of Kedla Underground Project at a distance of about 3.75 km from proposed washery site.

b) Power Power will be supplied from Basantpur sub-station .

- c) Railway siding for loading & dispatch of washed coal Railway siding is proposed at Kedla washery adjacent to proposed washery site. In case of delaying in construction of railway siding at Kedla washery , products of Tapin washery - washed coal and middling (washed coal power) will be transported by road to Chainpur Siding.
- d) Reject disposal/ utilisation Rejects produced from the washery is to be disposed off as per CIL policy