
Chapter – 11

COAL HANDLING & DESPATCH ARRANGEMENTS

11.0 INTRODUCTION

The proposed Coal Handling Plant envisages surface coal collection, conveying of the coal from the mine access trenches to the proposed washeries and loading the washed coal to the silos located at different points.

In Ib-Valley coalfields, three separate mine namely Lakhanpur OCP, Lilari OCP and Belpahar OCP are working side-by side. Out of which Lilari OCP is going to be exhausted. Rest of the two mines i.e. Lakhanpur OCP and Belpahar OCP will be in working condition. An integrated mine has been conceptualized by combining the three mines to one mine for a production of 40 Mty. There are two entry points to the mine and thus two outlets at northern and southern side.

It has been decided to construct one coal washery of 10 Mty capacity (named Ib-Valley washery) under BOM concept. Coal from receiving hoppers towards north will be transported by conveyors to the washery. After washing, washed coal will be transported by conveyors to silo for final dispatch by rail. To handle the blast free coal, Reclaim feeders has been proposed near the northern mine entry of Centrl Quarry. Necessary feeder breaker circuits with secondary crushers has also been proposed for small amount of oversized coal through drilling-blasting.

For 20 Mty ROM coal, receiving hoppers are proposed near southern entry of Central Quarry, which are also near to South Quarry exit. Coal will be transported by conveyors through over-ground bunker to two silos for rapid loading on rail. Balance 3.5 Mty coal will be dispatched to OPGC by rail from sidings and 6.5 Mty will be sold locally to nearby customers.

11.1 EXISTING STATUS

As per matrix transportation system, presently the entire coal is being extracted by surface miners from Belpahar as well as from Lakhanpur OCP. The surface miner's

coal i.e blast free coal is being dispatched through Y-curve siding, Ubda MGR siding, newly constructed no-5,6,7 siding and by road sale.

The detailed description of coal handling system for departmental variant has been elaborated here under.

11.2 DESIGN PARAMETERS

The design parameters considered for the proposed Coal Handling Plant are as under:

11.2.1 BASIC DATA

(A) GENERAL

(a) Location	:	Ib-valley coalfield of Mahanadi Coalfields, Odisha
(b) Annual mine target	:	40.0 Mt of coal
(c) Communication	:	Brajarajnagar on Howrah-Mumbai main line of south eastern railway zone is around 2 km away from the block.
(d) Ambient temperature	:	Max 47 ⁰ centigrade in summer, minimum 7 ⁰ degree centigrade in winter.
(e) Relative humidity	:	31% to 88% in September
(f) Main consumer	:	Thermal Power houses
(g) Life of the mine	:	41 yrs.

(B) COAL HANDLING PLANT

• Handling capacity	:	40.00 Mty
• No. of working days/year	:	330 days
• No. of working shifts/day	:	3
• Effective working hrs/shift	:	5
• Bulk density of ROM coal		
❖ For capacity calculation	:	0.8 tonne/cu.m
❖ For load calculation	:	1.2 tonne/cu.m.
• Product size	:	(-)100 mm

(C) COAL RECEIPT AND DISPATCH ARRANGEMENT

a. ROM coal size	:	(-) 100 mm
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- b. Coal Receipt : By reclaim feeder at access trenches of northern side and southern side as well as by feeder breaker circuits.
 - c. Coal Transport : By Pipe conveyors/conventional belt conveyors for surface transportation to feed the raw coal to proposed washeries. From washeries the transportation of coal shall be scope under BOMO. Three number of SILOs has been envisages at two different places to dispatch coal.
 - d. Proposed washed coal Dispatch: 7.40 Mty (Through proposed washery by Silo loading arrangement).
 - e. Proposed reject disposal : 2.60 Mty (as per extant rule after washery construction)

(D) RAPID LOADING SYSTEM FOR 7.4 Mt WASHED COAL and 20 Mty ROM COAL

- Silo capacity 4000 t
- No of Silo 3
- No. of Outlets 2 pockets for each silo
- Type of loading Pre-weigh hopper
- Loading rate Av. 5500 tph
- Type of Chute Traversing Telescopic chute
- Rake size 58 Box N / Equvt. wagons
- Wagon pay load 62 tonnes
- Rake capacity 3600 t
- Annual capacity 22 Mty

(E) WEIGHMENT

- Type of weigh bridge : Pre weigh hopper system of loading and in motion rail weigh bridges
- Wagon Marshalling : By locomotive of Railways @ 0.8 Km/hr

- (F) DUST SUPPRESSION : For the whole proposed CHP
- (G) FIRE FIGHTING & PLANT CLEANING SYSTEM : For the whole proposed CHP

11.2.2 SALIENT FEATURES OF CHP

For smooth operation, reclaim feeders has been envisaged near both the mine entries. Coal transportation by Pipe conveyor has been proposed from northern access trench to 10 Mty washery for pollution free transportation system.

11.2.3 SYSTEM DESCRIPTION

Integrated Lakhanpur, Belpahar, Lilari OCP is being planned to produce 40.0 Mty coal. The ROM coal shall be produced from the mine by blast free techniques i.e. by surface miners. However some coal shall be produced by conventional technique. For crushing of coal produced by conventional technique, feeder breaker with secondary crusher has been proposed at southern side of quarry.

Location of silos are shown in Coal flow diagram (**Plate No. ENGG-IIIA, IIIB, IIIC & ENGG-IVA, IVB, IVC**). The reject coal from washery will be dispatched as per extant rule after washery operation starts. Coal samples shall be collected by automatic sampler installed suitably onto the conveyors at pre-determined intervals of time and shall be sent to laboratory for analysis. Similarly, Electronic metal detectors and Magnetic separators shall also be installed on south quarry and north quarry at suitable locations for tramp metal removal.

From southern entry, entire 20 Mty coal will be fed in to the reclaim feeder (0-1000 tph variable capacity, 8 nos.) near access trench. A set of belt conveyor system C3A/B, C4A/B (tripper conv.) will be fed to an over ground bunker of 30000 t capacity. The coal will be reclaimed from the bunker by the conveyors C5A/B and subsequently fed to silos (2 nos. 4000t cap.) by the conveyors C6A/B and C7A/B.

The blast free and drilling blasting coal will be transported by contractual trucks/dumpers up to access trenches for Northern and Southern quarry. Near both the access trenches, 12 numbers of reclaim feeders (0-1000 tph variable capacity) has been envisaged to receive the blast free coal.

From northern entry, entire 10 Mty coal will be fed in to the reclaim feeder (0-1000 tph variable capacity, 4 nos.) near access trench. A set of belt conveyor system C1A/B, C2A/B, C3A/B (tripper conv.) will be fed to an over ground bunker of 10000 t capacity. The coal will be reclaimed from the bunker by the conveyors C4A/B and subsequently fed to silo (1no. 4000t cap.) by the conveyors C5A/B.

11.3 EQUIPMENT DESCRIPTION

- **RECLAIM FEEDERS**

Coal of (-) 100 mm size produced by surface miner in the mine shall be transported by tipping trucks/ dumpers and discharged at a suitable location at northern side and southern side where the Reclaim feeders are installed. The quantity, capacity and location of reclaim feeders deployment has been given below. Also one no of dozers has been envisaged for channelizing of coal to the reclaim feeders at each faces. The reclaim feeders shall discharge the coal into the belt conveyors.

The technical parameters for design of reclaim feeders are as under

A. FOR SOUTHERN SIDE

Quantity	: 8
Location	: Near access trench
Capacity avg.	: 0-1000 tph, variable capacity
Material to be handled	: As per rated capacity
Bulk Density	: 0.8 to 1.2 t/m ³

Material size	: (-) 100mm
Maximum inherent	: 8% moisture content
Approx. Power	: 110 kW

B. FOR NORTHERN SIDE

Quantity	: 4
Location	: Near access trench
Capacity avg.	: 0-1000 tph, variable capacity
Material to be handled	: As per rated capacity
Bulk Density	: 0.8 to 1.2 t/m ³
Material size	: (-) 100mm
Maximum inherent	: 8% moisture content
Approx. Power	: 110 kW

• FEEDER BREAKER

The feeder breaker circuit has been envisaged for crushing of coal extracted by drilling & blasting. Two nos. feeder breaker of 400 tph capacity has been proposed in southern side.

• LOAD OUT SYSTEM

The coal carried by the conveyors will be discharged into three numbers of silos of 4000 t capacity. There will be two outlets at the bottom of the each silo. These outlets / pockets at the silo bottom are fitted with pre weigh hoppers along with traversing telescopic chutes. The loading from the silo into wagons will be through pre weigh hoppers and the loading rate will be 5500 tph (Av.) from each of these outlets.

The silos will be designed in such a way that rakes can be loaded into it to the system railway tracks. The rake capacity will be around 3600 t (58 no. of box N or equivalent type of wagons of 62 t capacity each).

The silos shall be of R.C.C. construction and designed to take all the loads as expected in the system. Arch breakers, necessary silo discharge and maintenance gates, two numbers of pre-weigh hoppers, load cells for two numbers of pre-weigh hopper system of loading, traversing telescopic chutes, shear and crushable sections, hydraulic power pack, accumulator, cooling system, air compressors, hydraulic cylinders and valves, control desk with computer and color monitors to operate the

RLS through relay logic and all other miscellaneous items for the operation of two numbers of pre-weigh hopper system of loading, freight cum passenger lift, staircases etc. shall also form the part of the silo loading system. In addition to the above, calibrating test weight blocks, level sensors, temperature detector, air blasters etc are also envisaged.

11.3.3 DUST SUPPRESSION SYSTEM

The objective of this system is to reduce air pollution due to dust. Adequate number of nozzles will be installed at pre-determined transfer points, along the conventional conveyors for suppression of dust by spraying plain water in atomized condition and high pressure DS system. The dust suppression system shall be inter-locked with the conveyor system so that it will be in operation only when conveyors are running.

11.3.4 NOISE CONTROL SYSTEM

It is an accepted fact that noise is very uncomfortable to operating personnel. Provision is made to keep down the noise level to the recommended levels. All drive heads requiring heavy foundations will be fitted with energy absorbing anti vibration pads / sheets for reducing the vibration and there by noise.

11.3.5 FIRE FIGHTING SYSTEM

A suitably designed fire-fighting system has been envisaged for the plant. This includes fire hydrant system at locations vulnerable for fire. The system consists of high pressure pumps, supply pipe lines with necessary valves for operation. Hoses in hose boxes will be maintained at vulnerable locations as per standard practice. Suitable fire extinguishers will be provided to deal with electrical / oil / ordinary fires at all the required points in the plant like control room, sub-station buildings, drive houses, Silos etc. In addition to the above required nos. of sand buckets shall also be provided at key locations.

11.3.6 PLANT CLEANING SYSTEM

Provision for plant cleaning system has also been provided. Effluents discharged from the system shall also be collected and an effluent treatment plant is also envisaged.

11.3.7 PLANT MAINTENANCE

For effective maintenance of all the equipment, sufficient working space is provided around the drive heads, tail pulleys, and takes ups of each conveyor. All the conveyors shall be installed inside closed gantries. All the drive houses and transfer houses shall be covered and will be complete with hand rails, ladders, cross-overs etc. as per the requirement. Necessary electrical hoists and chain pulley blocks of adequate capacity are also provided at required locations where heavy components of conveyors are to be dealt.

11.3.8 WEIGHMENT SYSTEM

Two numbers of pre-weigh hoppers shall be fitted underneath each silo for accurate weighment of the wagons loaded. These shall load coal of pre-determined quantities into one number of wagon of the rakes placed on two separate number of railway tracks laid as per in the system drawing. The accuracy level of loading is ± 0.05 % (weighing accuracy) and ± 0.02 % (for complete rake) of the desired quantity of coal to be loaded in each wagon.

In addition in motion rail Weigh Bridges has also been envisaged for weighing purpose.

11.3.9 ELECTRONIC METAL DETECTORS

Metal detectors shall be installed on conveyor at a location of southern quarry and northern quarry. This shall be electronic type, suitable to be installed over 1600mm wide belt conveyor and 1400mm wide belt conveyor. This shall give an audio visual signal whenever non magnetic materials mixed with coal are passing along with the coal on the conveyor. The conveyor will be stopped for its removal as and when

required and the metallic pieces shall be removed manually and stored at a suitable location over a platform for further disposal.

11.3.10 IN LINE MAGNETIC SEPARATORS

Four nos. of magnetic separator or ILMS shall be suspended across the conveyors as envisaged in the system. This suspended magnet shall lift any magnetic metallic items passing along with the coal stream. The suspended magnet will be moved sideways and all the trapped magnetic items lifted by it will be discharged into a bin for further disposal.

The magnetic separator shall attract any tramp magnetic materials up to a weight of 50 kg.

11.3.11 COAL SAMPLING

It is proposed to incorporate an automatic sampler for raw coal section feeding to washeries. Coal samples will be collected by the primary sampler only at pre-determined intervals to assess the quality of the coal being dispatched. The samples will be collected and carried by a small feeder conveyor and stored in a bin and sent to the laboratory for analysis purposes. Sampling of washed coal shall be done by washery.

11.3.12 MATERIAL HANDLING

Necessary provision has been made like hoist blocks, electric hoists, chain pulley block etc. for lifting heavy materials.

11.4 PROPOSED POWER SUPPLY

11.4.1 POWER SUPPLY ARRANGEMENT

The surface conveyors SILO loading arrangement are proposed to feed power from the proposed 3X12.5 MVA, 33/6.6 kV project substation – I (North Quarry) and 3X12.5 MVA, 33/6.6 kV project substation – II (South Quarry).

The tail end of pipe conveyors (P1), surface conveyors C1A/B and other associated loads proposed to be installed in north quarry for transportation of 10 Mty coal from north quarry to 10 Mty washery & 20 Mty washery will feed power at 6.6 kV from project substation – I.

The surface conveyors C3A/B, discharge end of conveyors and other associated loads proposed to be installed in southern quarry for transportation of 20 Mty coal to 20 Mty washery and three numbers of SILO loading arrangement proposed to dispatch washed coal from 10 Mty washery & 20 Mty washery will feed power at 6.6 kV from project substation – II.

The LT loads proposed in north quarry will receive power at 415V from 33/6.6 kV project substation-I and LT loads proposed in south quarry will receive power at 415V from 33/6.6 kV project substation-II.

Provision for six numbers (two feeders at S/S-1 & four feeders at S/S-2) outgoing feeders have been kept for pipe conveyor, surface conveyor system and three nos. of SILOs at 6.6 kV switch boards at project substation –I & II.