

# JINDAL OPEN CAST COAL MINE #1



## UNIT PROFILE

*FOR NATIONAL ENERGY CONSERVATION AWARD - 2007*

**JINDAL**

**STEEL & POWER LIMITED**

*RAIGARH (C.G.)*

## UNIT PROFILE

### JINDAL OPEN CAST COAL MINE#1 *(Captive Coal Mine of Jindal Steel & Power Ltd.)*

Jindal Steel & Power Ltd, a private sector company is today's world largest Coal based Sponge Iron producer through 'Direct reduction' process with installed capacity of 6.00 MTPA. In the beginning, Coal requirement of the plant was met from South Eastern Coalfields Ltd. Mr. O. P. Jindal, Owner of the JSPL, was enthusiastic and courageous enough to show keen interest in developing the nearby Gare Coalfield, which was then not accessible even by road. He established the infrastructure, such as road, power etc and this mine was the first coal mine started in this area.

There could not be a better time to appreciate and respect the foresight of our visionary founder Late Shri O. P. Jindal Ji, who in the quest of securing raw material sufficiency for JSPL, acquired the coal block IV/1 way back in 1996 which categorically contained low grade non coking coal in seams thickness varying from 1.5m to 5.5m.

The boldness of judgement, which was inherent of the personality of our revered Babuji gave way to pioneering effort in the field of mining low grade non- coking coal for subsequent end use in sponge iron making at JSPL's Raigarh plant.

Since then JSPL has traversed consummately in the development of the coal block IV/1 in conjunction with coal beneficiation plant; from 2mtpa to 6mtpa to utilize even ungraded coal economically in the face of scarce coal reserve of our nation and in true sense serving The Coal Mines (Conservation & Development) Act.

Mining of ungraded coal, which was not considered feasible in the project phase of our mine has added substantial reserve of coal in the prevailing reserve of graded coal within our existing lease hold area.

**These ungraded coal co-exist with all the four major seams namely X, IX, VIII & VII(T&M), which resulted in 2-4% upward movement in ash% as analysed in graded structure of coal seams. VII(B) seam which majorly contained ungraded coal and was out rightly not considered amenable to mining at the project stage is being mined and benefited economically and giving overall cost advantage. The techno-commercial aspect of mining VII(B).**

**The proposed extension (273.098 Ha) of our lease hold area, which includes protected forests in the eastern and western side of our mine will enhance the reserve to 122 million tons (including ungraded coal) and to 91 million tons (excluding ungraded coal) as on 1st Sep 2007.**

**Recently, to secure coal supply for its DRI plant at Raigarh, JSPL jointly with Nalwa has acquired another coal block IV/6 in the Gare area of Mand Raigarh Coalfield. The block contains 66 million tons of open castable coal reserve and 34 million tons of u/g reserve. Mining from this coal block shall cater to washed coal requirement of M/S Nalwa, which shall be in the range of 0.5-0.6 million tons, in addition to fulfilling the requirement of JSPL.**

**The time phasing of all the project activities of block IV/6 has been worked out and it is estimated to commence production in Oct' 2008.**

**With two coal blocks with combined graded reserve of 190 million tons as on 1.9.2007. A combined production planning has been formulated to meet washed coal requirement of 2.2 million tons in JSPL and 0.6 million tons in M/S Nalwa.**

**The raw coal production from both the blocks shall stabilize at 9 million tons per annum, of which 5 million tons shall be from IV/1 and 4 million tons from IV/6.**

**Since the existing washing facility is only 6 million tons an additional washery with installed capacity of 4 mtpa has been proposed to be installed at IV/6.**

**One major cause of concern is utilization of middlings generated through out the years. With 135×4 MW power plant already sanctioned for erection at IV/1 and is likely to be operational by 2008-2009.**

## **COAL WASHERY**

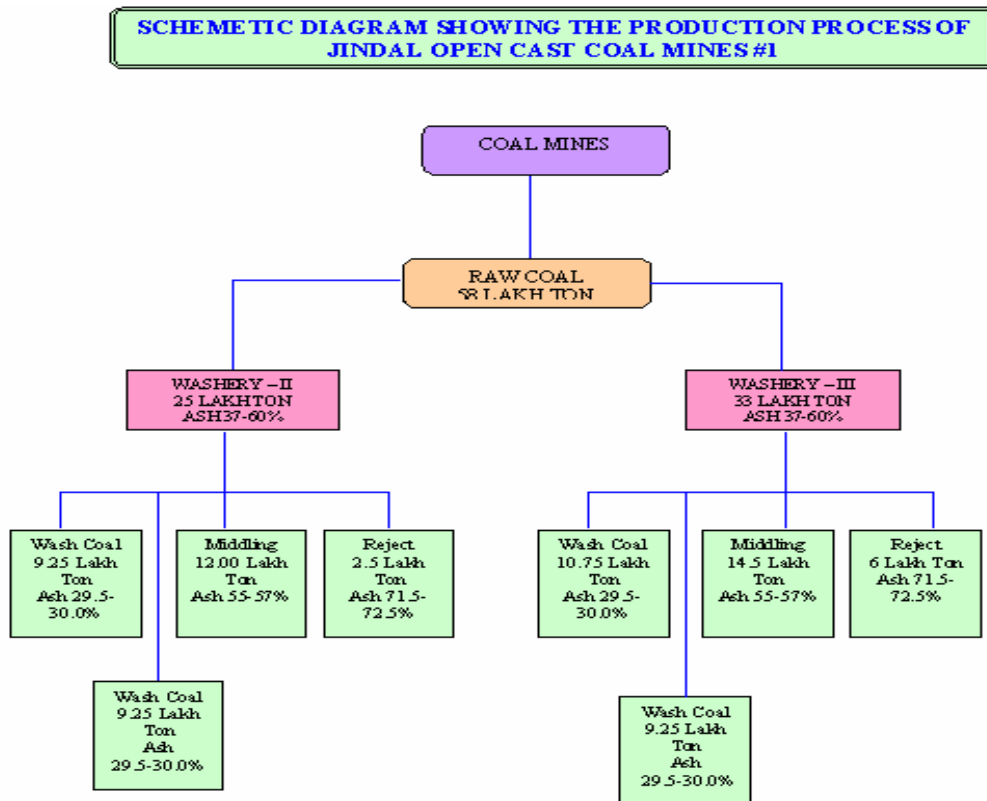
The first coal washing plant with a capacity of 200TPH was setup at Raigarh. This was a Batac Jig Washery and raw coal from the mines was washed in this washery to meet the coal requirement of the DRI.

Despite the advantages of wash coal from our own mine over the purchased coal of similar grade, this washery had a few limitations. Out of different seams of coal in the mines only the best grade coal (IX seam) was fed to the washery.

To meet the increased demand of DRI grade coal for the expansion plans of the company, a 2.5MTPA washery and a 3.5 MTPA washery, Washery II & Washery III respectively were commissioned at the pithead of the JOCCM block IV / 1 in Dongamahua.

Washery II was commissioned in August 2002. First Circuit of Washery III was commissioned in January 2005 and second circuit commissioned in April

The product chart of the washeries (Washery – II & III) is as follows:



## PROCESS DESCRIPTION

The Run of Mine is crushed by Rotary Breakers from -600mm to -200mm & stored in Raw Coal Bunkers of 5000 T capacity. The Raw Coal from bunkers & a Rotary Breaker (RB-3) feed coal to Crushing plant, which has four different Crushing & Screening circuits;

Crushing plant I has a capacity of 250TPH. The Raw Coal is crushed to -25mm size coal in two stage Crushing & screening plant. The crushed coal is stored in Crush Coal Bunkers of capacity 2500T for feeding to the HM Cyclones in Coal Washery II.

Crushing plant II has a capacity of 250 TPH. The Raw Coal is crushed to -25mm size in two stages. The crushed coal is fed to the Deshaling plant of washery II, where the coal is deshaled (Here we feed VII seam coal of 57% ash) in a Coal Washer before feeding to DM Cyclone circuit. The coal can also be stored in Crush Coal Bunkers if required.

Crushing plant III & IV each have a capacity of 375TPH. The Raw coal is crushed to -28mm size in two stage Crushing plant. The crushed coal is stored in the crush coal bunkers having a capacity of 2500 Tons for feeding coal to Washery III

Crush Coal from either set of CC Bunkers (Washery II & III) can be taken in any of the washeries as per the requirement.

## PROCESS

Washery II is a two-stage coal washing plant with a capacity of 2.5MTPA. The crushed coal of lower ash seam is directly washed in the dense medium Cyclones after desliming at 1mm. The deslimed coal + 1 - 25mm size coal goes to the Heavy media tank for feeding to HM Cyclones.

For crushed coal of inferior grade we have option to wash it directly in HM Cyclones or to deshale it in a DM Bath before feeding it to the HM Cyclones.

Crush coal (VII seam) is first deslimed at 1mm# in Desliming screens and then fed to the Dense Medium Bath for separating Rejects (of ash% >72%). The deshaled coal goes to the Heavy media tank along with deslimed raw coal of VIII & IX seam. Here after mixing with heavy media of appropriate specific gravity fed to HM Cyclones.

**Washery III is a 3.5MTPA washery. It has three independent circuits, Circuit I & II are two stage-washing (HM bath & HM Cyclone) circuits and circuit III is a single stage HM Cyclone circuit. Feed from the main feed conveyor is divided into three different circuits.**

**The only difference between Washery-II & III is that in Washery-III all coal is first deshaled and then fed in the Heavy Media tank for onward separation in Cyclones and in Washery-II 50% coal is directly fed in Heavy Media tank and 50% coal is fed in Heavy Media tank after deshaling. All other process is identical to Washery-II.**

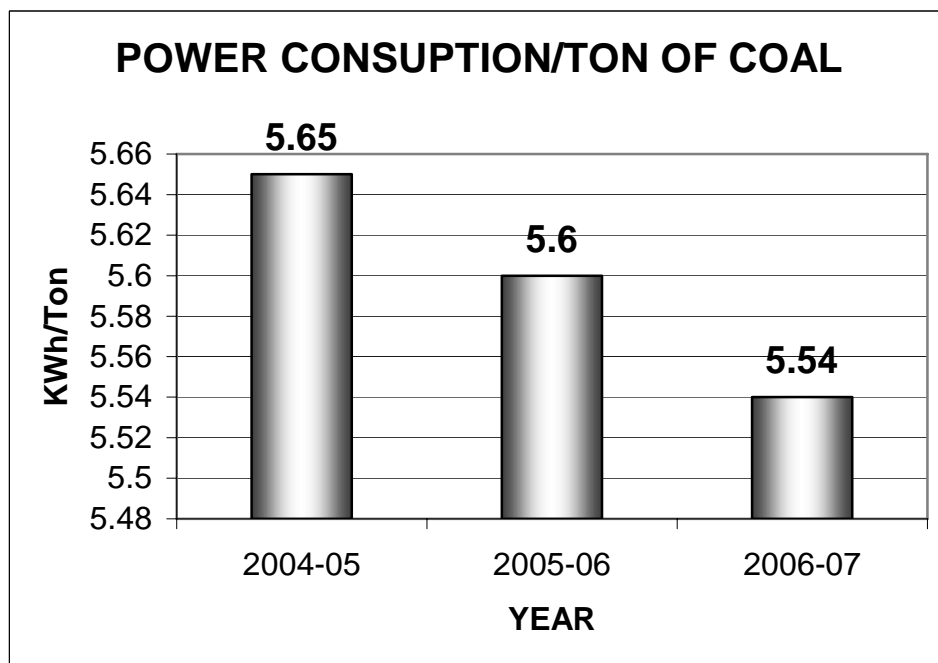
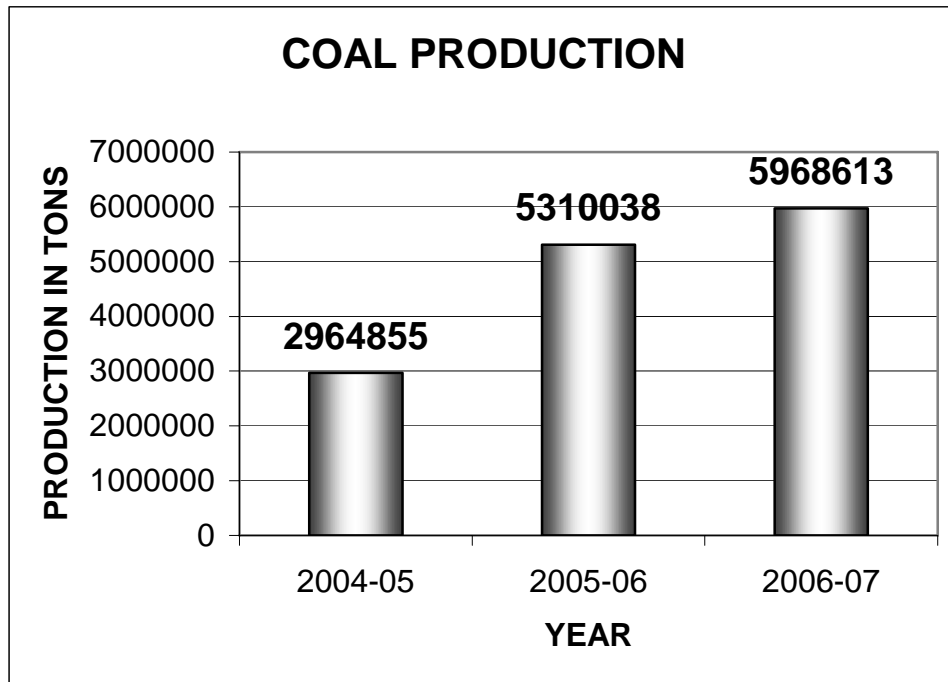
**The desired quality parameters are clean coal ash of 29.5-30% & middlings ash 55-57%. The wash coal is dewatered in a Centrifuge machine so as to deliver wash coal with 17.5 % moisture. The wash coal is finally screened to remove -3mm fraction coal so that dispatched product contains about 14% of -3mm fraction.**

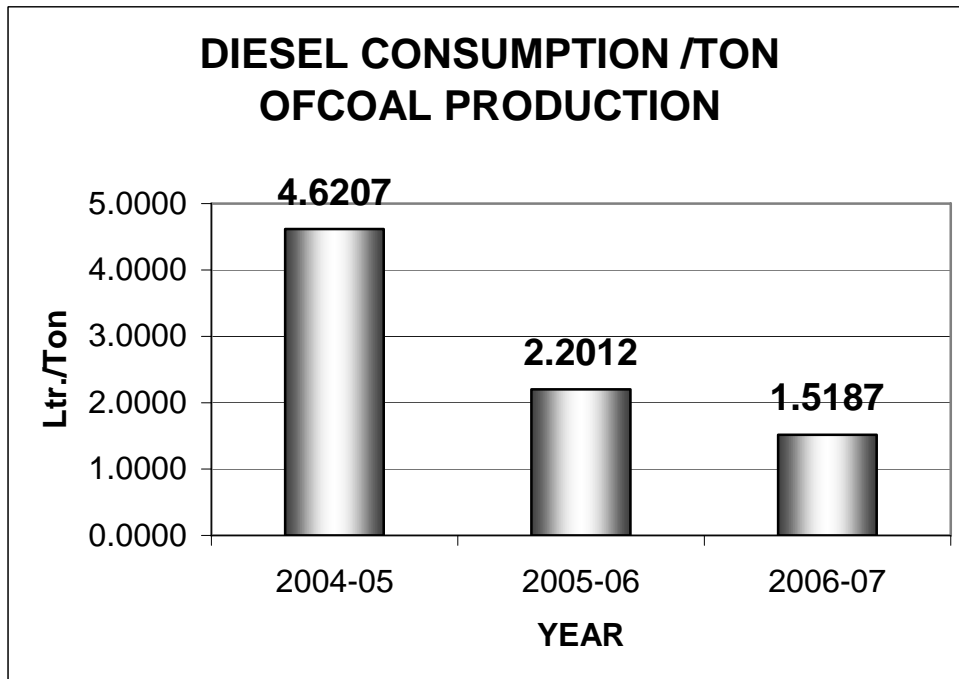
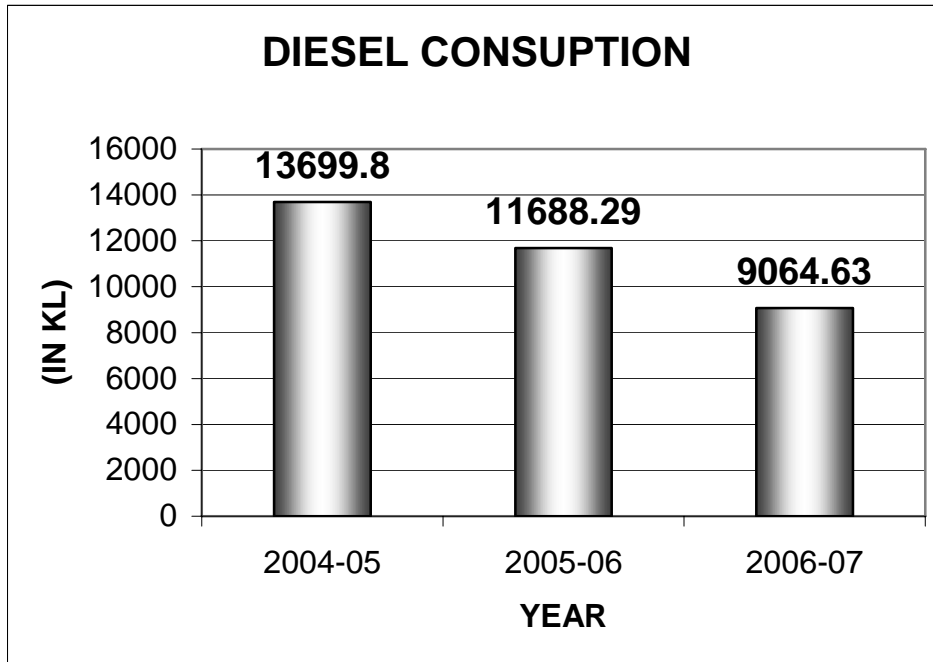
**The final products for the washeries, wash coal, middlings & Rejects are conveyed by belt conveyors to overhead Bunkers for truck loading. The wash Coal is dispatched to Raigarh for the DRI operations. The middling coal is also dispatched to Raigarh for Power plant consumption.**

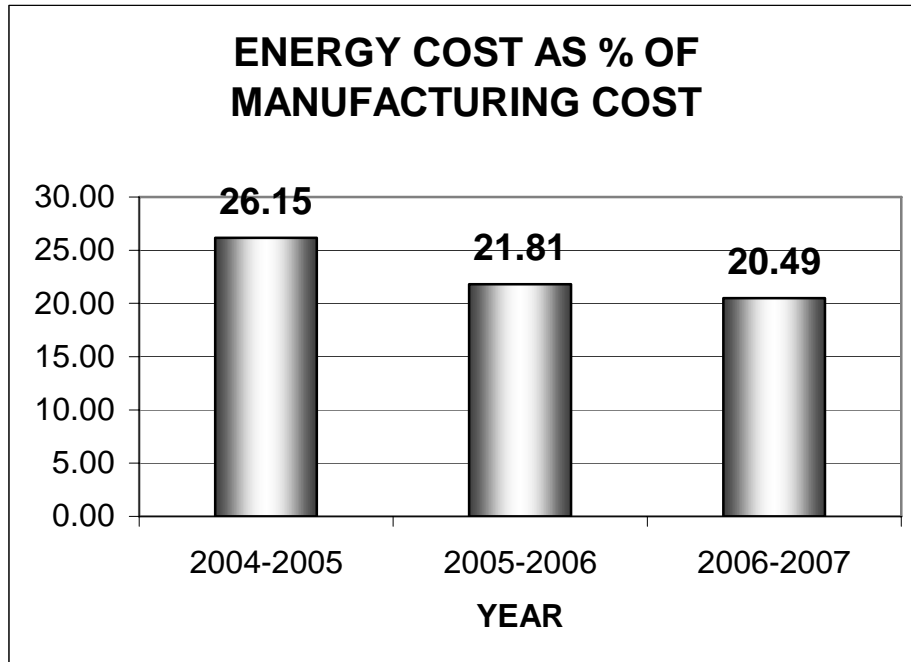
**Fine Coal Treatment: The deslimed material, -1mm size coal goes to the fine coal tank from where it is pumped to a battery of Classifying Cyclones. The underflow of the classifying cyclones (+150  $\mu$ ) is dewatered in a high frequency screen & mixed with process middlings. The -150  $\mu$  material is fed to the Thickener. The Thickened slurry from the underflow of the thickener pumped to a mines pond where a flocculant dosing system has been incorporated for quick release of trapped water from the slurry. This water is filtered through a thick wall of rejects and we get sufficiently clear water which is fed back to washery. This has allowed us to maintain a close circuit.**

**The process of the entire plant is controlled by the PLC from the Computers in the control room. Level indicators & controllers, density gauge, Automatic control valves, diverter boxes, Belt weight meters and many more electronic gadgets with remote control facility**

**Specific Energy consumption figures over last three years show steady decline, due to continuously effort towards energy conservation.**







**CLEAN & GREEN COAL MINES**