

ELKVIEW PREPARATION PLANT  
OPERATION

M. S. Miller  
003405

The Elkview preparation plant processes an average of 25,000 tons of raw coal per day and produces 20,000 tons per day of clean coal. The remaining 5,000 tons per day is disposed of on the coarse refuse stockpile and in the fine refuse lagoons. The raw coal coming into the plant averages 16% ash, the clean coal produced averages 9.5% ash. The ash content of the coal is reduced by "washing" the raw coal, this simply means removal of the high ash coal and rock from the raw coal. This takes place by treating the raw coal by heavy media separation, hydrocyclones, and froth flotation.

The heavy media separation utilizes the fact that coal gets heavier as its ash content increases. The heavy media itself is a slurry or mixture of finely ground magnetite (minus 50 microns) and water. When raw coal is mixed with the heavy media, the low ash coal will float to the top and the higher ash material will sink. The ash content of the material that floats is controlled by varying the proportion of magnetite to water in the heavy media. If the heavy media specific gravity is increased by adding more magnetite, then more higher ash material will float. If a lower ash content is required then the specific gravity will be lowered by reducing the amount of magnetite in the heavy media and therefore only lower ash material will be floated.

The hydrocyclones also utilize the differences in specific gravity of low ash coal and high ash coal to remove high ash coal from the raw coal. The hydrocyclones operate by creating a dense bed of high ash material at the bottom of the cyclone, the low ash material being fairly light cannot penetrate or pass through this bed and is removed through the cyclone overflow. The high ash material which is heavier is able to penetrate the bed and is removed through the cyclone underflow.

The froth flotation process works by mixing kerosene with the very fine raw coal, the kerosene coats only the coal particles and does not coat the fine rock particles. The kerosene coated coal particles are now water-repellent, the mixture of fine coal and rock is then agitated in a flotation machine or cell. The flotation cell causes small air bubbles to be formed and the kerosene coated coal particles will stick to the air bubbles. The bubbles or froth rise to the top of the flotation cell and are removed by paddle wheels.

The raw coal is fed to the plant at a controlled rate of 1600 tons per hour from the Raw Coal Silos. As it enters the plant it is mixed with water and screened to 6.5 cm. on the raw coal screens. The plus 6.5 cm. raw coal is treated in the heavy media vessel circuit, the clean coal floats to the top of the vessel and is skimmed off by paddle wheels. The rock or refuse sinks to the bottom of the vessel and is removed by a drag chain elevator. Both the clean coal and refuse pass over screens where any magnetite that has stuck to the particles is washed off by water sprays. The magnetite which is washed off is treated in the magnetite recovery circuits and re-used in the plant. The clean coal is then conveyed to the clean coal silos, the refuse is conveyed to the coarse refuse bin where it is loaded into a twin scraper and stockpiled on the coarse refuse stockpile.

The minus 6.5 cm. material from the raw coal screens is re-screened on the desliming screens to 28 mesh (0.5 mm), the plus 28 mesh raw coal is treated in the heavy media cyclones. The heavy media cyclone utilizes centrifugal forces to make the clean coal "float" and the refuse sink. The clean coal is removed through the cyclone overflow and the refuse is removed through the cyclone underflow. The coal and refuse are passed over screens to wash off the magnetite particles from the coal particles. The refuse is conveyed to the coarse refuse bin and the clean coal is sent to centrifuges. The centrifuges reduce the moisture content of the coal to 9%, the partially dried coal is then conveyed to the dryer.

The minus 28 mesh material from the desliming screens is pumped to the primary hydrocyclones. The cyclone underflow or high ash material is then pumped to the secondary hydrocyclones which will remove any low ash material that may have been removed with the hydrocyclone underflow. The secondary hydrocyclone underflow is dewatered and is stockpiled on the refuse stockpile. The secondary hydrocyclone overflow is pumped to the primary hydrocyclones. The primary hydrocyclone overflow is screened on the rapped sieve bends to 100 mesh (150 microns). The plus 100 mesh material which is low ash is sent to the filters. Kerosene is added to the minus 100 mesh material and it is then sent to the flotation cells. The flotation cell overflow or clean coal is sent to the filters combined with the plus 100 mesh material from the rapped sieve bends. The flotation cell underflow is sent to the #2 static thickner where the solids are settled out and pumped to the fine refuse pond. The filter cake is sent to the dryer with the centrifuged clean coal from the heavy media cyclones. The filter effluent is sent to the #1 static thickner, the solids from this thickner are sent

back to the filters. The water from the two thickeners is re-used in the plant.

The dryer is a fluid bed dryer, it operates by blowing a large volume of heated air through a bed of wet coal. The heated air evaporates the moisture from the coal and the dried coal is sent to the clean coal silos. The air is heated by natural gas and is blown through the dryer at 14,000 cubic meters per minute by a 5000 HP fan. The air that has passed through the bed of coal passes through a bank of four dust cyclones and a wet scrubber to remove the dust from the air before it is discharged to the atmosphere. The exhausted air contains about 0.1 grams of dust per cubic meter.

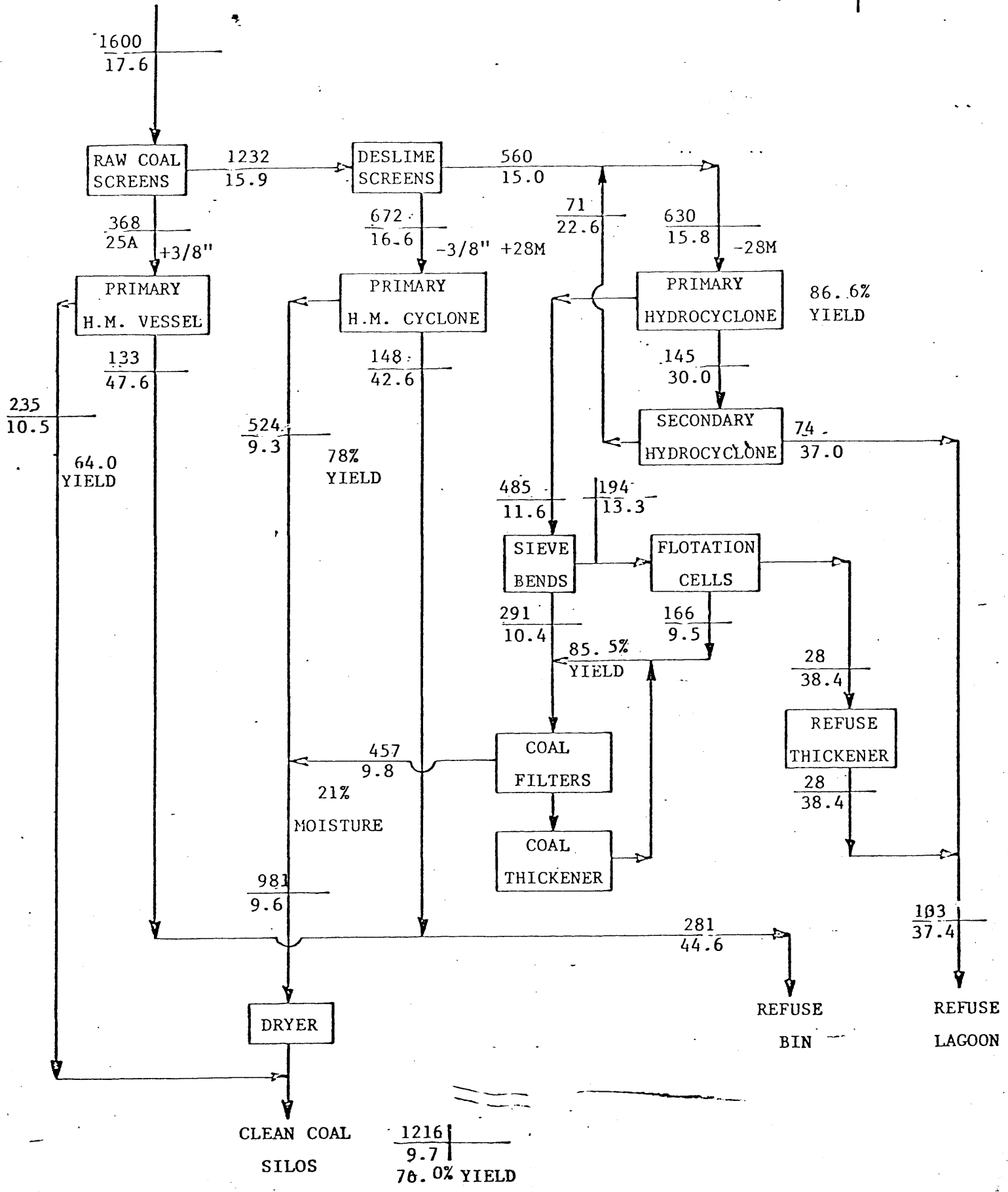
The coal in the clean coal silos is loaded into 110 car unit trains, there are an average of 2 trains daily. The trains are loaded by chutes under the silos, the train travels under the silos at 0.8 KM per hour and an operator lowers the chute to fill the car as it passes under the silos. It takes approximately three hours to load one unit train. Each car containing about 91 metric tons is sprayed with a latex chemical which forms a thick crust on the car as it is transported to the bulk loading terminal at Robert's Bank on the coast.

The Elkview Plant employs a total of 150 men, this includes about 80 operators, 60 mechanics, welders, electricians etc, and 12 staff members. Each shift crew comprises 18 operators, 2 shift mechanics, one electrician and 2 foremen. The plant operates 7 days a week on a three shift per day basis.

G. J. Palmer  
Plant Engineer

PLANT FEED  
BELT

WEIGHT tph  
ASH, %



FL O W S H E E T  
(MATERIAL BALANCE)