



THE EFFECT OF EXCESSIVELY WET COAL ON PRODUCTION OF ELECTRICITY

Coal and the steam generating process

Coal from a mine is fed to the power station coal silos/staiths and storage bunkers by means of conveyor belts. These conveyors runs for many kilometres and there are various sections of conveyor, each with its own drive.

From the storage bunkers the coal is fed into pulverising mills where it is ground into dust as fine as cake flour. A stream of hot air blasts this powdered coal from the mills through coal burners to the boiler furnace where it burns like a gas. The hot air not only transports the coal from the mills to the boiler furnace, it also dries out the coal.

In a boiler, heat released by the burning coal is absorbed by many kilometres of tubing which form the boiler walls. Inside the tubes, water is converted to steam at high temperature and pressure. This expanding high temperature steam is now the energy required to drive turbines connected to generators for power generation.

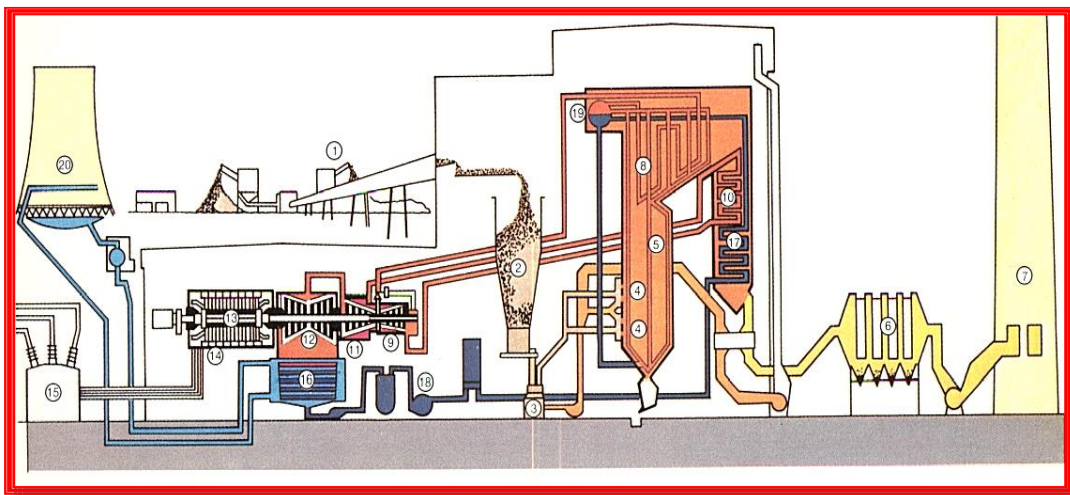
The effect of excessive water on the coal

Coal normally contains both inherent as well as surface moisture, together referred to as total moisture. When coal becomes too wet, the transportation of the coal poses problems for the power stations as it tends to block transfer chutes where coal is transferred from one conveyor to another. It also causes “hang-ups” in bunkers, hindering the free flow of coal. Wet pulverized coal can also result in the clogging of milling plant and associated pipework.

The temperature of the coal entering a boiler furnace is $\pm 90^{\circ}\text{C}$. The reason for having the coal at such a high temperature is to ensure that combustion is taking place in the shortest possible time and within the confinement of the boiler furnace. When the coal is removed from the mills through a blast of hot air, if the coal is too wet, the drying out is ineffective and has a negative effect on the combustion of coal. In other words, if the total moisture content becomes too high, the amount of heat energy required to evaporate the moisture is greater than the boiler design allows. This limits the amount of coal that can be dried for the milling process and the amount of pulverised coal that can be fired into the boiler, in turn limiting the amount of electricity that can be generated.

Why is the coal wet?

Excessive total moisture typically results from excessive rain and uncontrollably high surface water content in the raw coal. Coal from the mines, whether open cast or underground mining, is stored on stockpiles from where it is reclaimed for power station use. Wet coal poses more problems for open cast mining operations as it affects the whole operation of mining, removal of the over burden, coal and the transportation of coal to the coal stock yard operations.



1. Mine
2. Coal Bunker
3. Coal Mill
4. Boiler Burners
5. Furnace
6. Bag Filters or Percipitators
7. Smoke Stack
8. Superheated Steam Tubes
9. High Pressure Turbines
10. Re-heating Steam Tubes
11. IP Turbines
12. LP Turbines
13. Generator
14. Stator
15. Transformer
16. Steam Condenser
17. Feedwater Heating
18. Feedwater Supply pump
19. Water Drum
20. Cooling Tower

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