

# WAYS OF REALIZATION OF COAL DEPOSITS

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**Abstract:** In this paper are presented the importance and the ways of realization of the coal deposits resulting in the storage of larger quantities of coal in the deposit on the same surface, the production of solid fuel coal with the same calorific value, the reduction of the permeability stack, avoiding auto-ignition, homogenizing different qualities of coal, avoiding thermal variations in boiler operation.

**Keywords:** coal deposits, coal homogenization, coal deposits formation and compacting

## 1. Introduction

Coal deposits are designed to ensure the coal supply necessary for the operation of the energy blocks (fig.1), in certain situations such as: disruption of the operation of the coal bands forming part of the transport buses; defects in coal-mining machinery, and KsS-type combined coal-mining machines; periods of meetings, strikes; providing stocks for the winter. A storage system is characterized by input volumes, which are quantitatively the same as the removal volumes, but which are essentially different in time [1]. A storage system is defined by the following components: storage space; products to be stored; used machines; training technologies; tracking and control system.



Fig.1. Overview of coal deposits 1 and 2 at the Rovinari Thermal Power Plant.

Designing a storage system is technically and economically determined by the degree of mechanization that largely depends on the type of storage and the variety of the material.

## 2. Classification of coal deposits

Coal deposits are classified according to several criteria:

- After service life;
- By location;
- After the position of the career outline;
- According to the construction of the warehouses;
- After the position of the storage platform against the tread;
- After the arrangement of the storage capacities;
- Stack format.

As far as the deposits from producers and consumers in Romania are concerned, they are characterized as: permanent, uncovered, at the level of the running track, with balancing and compacted rule platforms, rectangular with capacities framed in all classes [1].

### 3. Construction of coal deposits

The construction and arrangement of coal deposits is done after the project which must include calculation elements for sizing, construction details and cost assessment calculations. The most important part of a warehouse is the storage platform. The stock platform is a landscaping area for the formation of coal stacks [1]. Storage platforms will be raised to the surrounding terrain to avoid flooding. The construction of the storage platforms can be made of concrete or arranged with a layer of ballast, gravel, slag or earth, which compact with appropriate means. The best deposits are with concrete platforms, the others are at risk of surface degradation over time as a result of the weather and the need for permanent transport of means (bulldozers, compactors) with negative influences on the quality of the stored coal. The installations in the warehouse mostly circulate on rails. Track rails are placed on metallic or reinforced concrete sleepers and the infrastructure can be concreted or arranged. Crossbows can be normal or short lengths. The short crossbars are 10 to 10 meters tied with steel rails to keep the gauge. The track gauge corresponds to each machine in the warehouse. Even if stock platforms are built and fitted with ballast or earth, the track infrastructure must be concreted [1].

### 4. Formation and compacting of coal deposits

Coal deposits are formed by the deposition of coal from the main strip circuit by means of coal-fired power-driven machines. They have dual functionality and can be used both for charging coal in a stack of coal and for removing it from the stack and sending coal to the bridges that feed the coal mills of the thermal power plant. At the Rovinari Thermal Power Plant (fig.2)., coal deposits are formed by depositing coal in stacks of several quarries from which coal is received, which is to be filled with bulldozers. The volumes of stacks are chosen according to the installed power of the thermoelectric power plant. Coal deposits are made with regular geometric shapes and are located at safe distances from heat sources. They have rectangular, square or trapezoidal bases (with a circular or circular section) with the slightly sloping upper surface.



Fig.2. Overview of the KsS 01 excavator at the Rovinari thermal power plant.

Coal deposits (fig.3) must be carried out in successive layers until the total height of the stack is exhausted, which height will be determined by the length of the stowage arm or the combined pick and take machine.

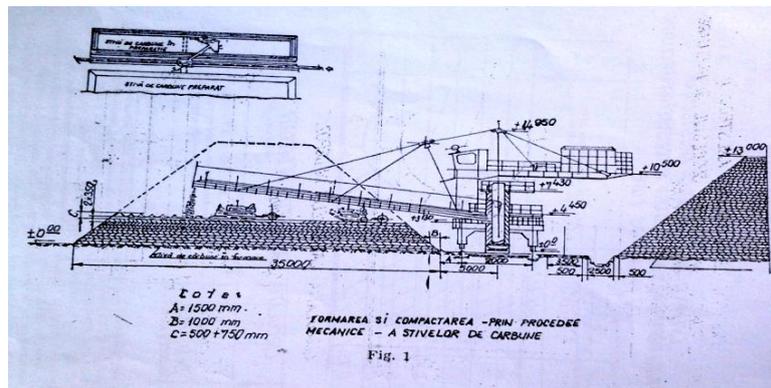


Figure 3. How to build the coal deposit

To reduce permeability of the stack, four additional passes will be considered with the bulldozer over the last layer deposited in the stack, the temperature of the coals will not exceed  $+35 + 40^{\circ} \text{C}$ , and the coats will have a thickness of 0.5-0,75 m compaction, operation continuing to the desired height. To avoid self-inflation, since the self-heating phenomenon occurs much more rapidly in the bend area, it will be necessary to compress the slopes either with a bulldozer attached to the bulldozer or with the bulldozer if the angle and the length of the slope allow it. It is known that fuel combustion is favored by volatile materials contained in coal: CO, CH<sub>4</sub>, H<sub>2</sub>, S<sub>2</sub>. These volatile materials are the first substances that evolve upon heating the fuel [\*]. It is advisable to homogenize the coals of different qualities. This is to achieve a constant quality charcoal feed when extracted by coal-fired machines (calorific variation of  $\pm 5\%$ ) to avoid thermal variations in boiler operation.

The homogenization operation can be carried out in three situations: 1. Homogenisation at discharge stations (not the Rovinari thermal plant because it receives coal through the coal transport buses); 2. Homogenization in warehouses; 3. Banding homogenization.

## 5. Homogenisation in storage facilities

Depending on how the material is deposited in the warehouses, there are the following types of homogenization: Chevron method, Windrow method, Kelly method, Peha-Chevcon method.

Below are described the Chevron method, the Windrow method and the Kelly method.

**The Chevron method** (fig.4) - by this method, depositing coal in the deposit is made in layers, the depositing machine begins depositing a layer in the middle of the deposit base, and then each subsequent layer is discharged above the top line of the first layer. In the section, it appears that the coal deposit is formed by depositing coal in layers, with a certain discharge angle over the entire length of the deposit. As the height of the deposit grows, its section increases, as well as the possibility of segregation of the deposited material according to the granulometric classes and the specific weight of the coal. Segregation will not affect the efficiency of homogenization if the take-over of coal is made only with a single loading machine, which always takes the material over the whole section of the deposit. For these purposes, scrapers and bucket or drum wheel loaders [1] may be used.

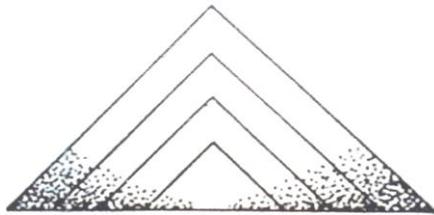


Figure 4. Homogenisation by Chevron method

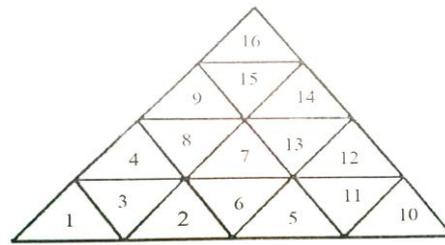


Figure 5. Homogenization by the Windrow method.

**The windrow method** (fig.5) -in the case of this method, the deposit machine discharges the coal over the entire width of the deposit, according to the technology developed for the formation of the deposit.

Then, the resulting unevenness is filled and the next layer is deposited on a certain surface of the deposit. The amount of material deposited as separate layers is established in the plan drawn up, depending on the feed material and the size of the deposit.

**The Kelly method** - this method applies only to the homogenization of heaps with a continuous working regime, ie in the case of circular warehouses. Under this method, a certain amount of ordinary coal is deposited in the form of a prism. One of the slopes will be  $42^\circ$ , and the second one will be formed by depositing at an angle of  $10-20^\circ$ , in a circular form, in the sense of clockwise movement, by the Chevron method. This method is relatively expensive.

## 6. Conclusions

As a result of the methods of coal deposit formation the following results will be obtained:

- reducing stack permeability;
- avoiding self-harm;
- homogenization of different qualities of coal;
- avoiding thermal variations in boiler operation.
- the storage of larger quantities of coal in the deposit on the same surface;
- the possibility of segregation of the deposited material according to the granulometric classes and the specific weight of the coal.

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