COAL STOCKPILES DESIGN FOR REDUCING SURFACE LAND AFFECTED

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Abstract. *Coal stockpile systems are designed for a particular capacity and have equipment designed to achieve those rates. Where there is a change in the design parameters of the coal stockpile such as stockpile or reclaim capacity, or a change in the way the system is operated, there is a possibility that the change could result in a risk to people, equipment or the environment. A review of the hazards and risk control methods shall be conducted whenever coal stockpiles are significantly changed. Bulk material placed by tipping, discharge from overhead conveyors and trippers and dozing will contain areas of instability. Placement areas are not designed as engineered compacted fill and the degree of compaction, size and shape is constantly changing. In this paper are described methods that can be applied for reduction surface land affected of stockpile.*

Key words: *configuration, coal, stockpile, surface, affected.*

INTRODUCTION

Design of a coal stockpile is governed by the physical parameters of each site and the related economic considerations. Among these parameters are the kind and quantity of coal, the physical size and shape of the property, and the orientation of railroad tracks. All coal mining in open pit purpose as transfer points for moving coal from land to unit trains. Generally, coal is unloaded from unit trains and placed on a conveyor system, which carries and stockpiles the coal in a stockpile.

The major adverse environmental effects associated with a coal stockpile are usually caused by coal dust and coal pile drainage. When these two sources of environmental damage are well documented, control techniques will be used to reduce the impact potential to acceptable levels. This generally involves the development of comprehensive dust control and water quality treatment systems. Without these systems, the degradation of air and water quality could pose serious problems for surrounding social and biotic communities. In many situations, the degradation od water, air and auditory quality can be responsible for additional effects on ecological communities, land use and visual quality.

Mitigation of adverse impacts is one of the more obvious approaches used to reduce or eliminate undesirable effects from facility development. This is cause for reconfiguration an existing coal stockpile in coal open pit from Oltenia, mainly reduction of surface land affectation.

The predominant mining and storage-delivery technology from Oltenia coal open pits consists of excavating the tailings and coal by bucket wheel excavators and the transport is performed using belt conveyors. The tailings are storage in waste dumps through storage machines and the lignite is storage with specific facilities or directly loaded into wagons and shipped to power plants.

The storage operational capacity is calculated for a 7-15 days of uninterrupted activity in the open pits.

The stockpiles built inside the open pits are permanent, as long as the open pits are in function. They are located in the vicinity of mining operational perimeters, usually operating outside the exploitation areas.

The availability of land for the construction of stockpiles in this area is limited both by natural conditions – the area is hilly – and by planning costs.

MATERIAL AND METHODS

Designing the storage systems in this area aimed to ensure the continued operation of the open pits in accordance with the technological processes of the exploitation perimeters, while the shipment and delivery systems are not conducted rhythmically. This is because the excavators operate alternately in sterile rocks and coal layers.

Currently the cutting/extraction technology in the coal layers can not be individualized.

As such, it can not be identified the possibility of continuous production, this being dependent on the time required for the removal of the overburden [3]. In this context, the storage capacity of the stockpiles must ensure the uninterrupted activity of the open pits during periods when the lignite is excavated. During the excavation of the sterile rocks there must be ensured the uninterrupted loading and dispatch of lignite to consuming power plants.

The technological flux for two open pits from Oltenia is illustrated in figures 1 and 2.

Schematic diagram reveals that the lignite extracted from the working fronts of South Jilt open pit is transported to the coal stockpile by conveyor belts, then is passed through the crushing station and storage in piles or loaded directly into wagons (figure 1).

The capacity of the lignite stockpile is of 150,000 tons.

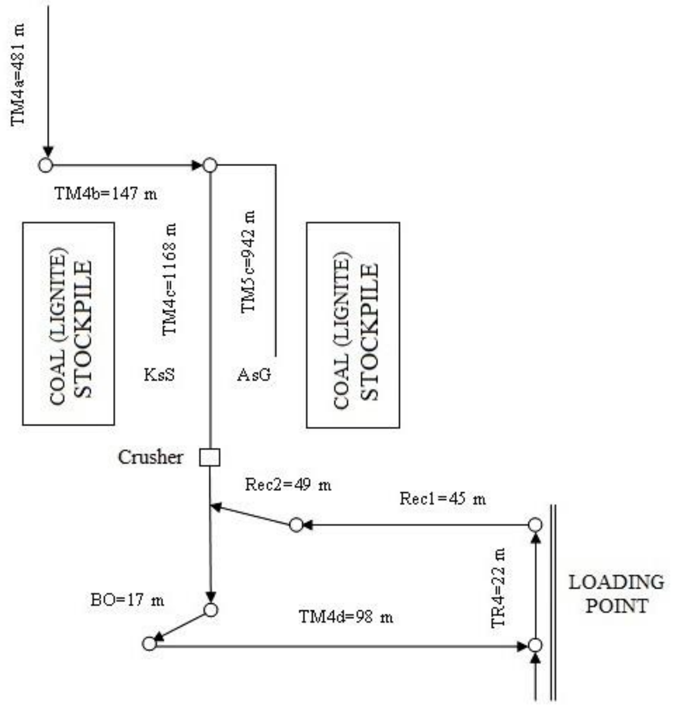

Figure 1. Technological flux of South Jilt open pit.

The coal extracted from North Jilt open pit follows the same pattern as in South Jilt open pit (figure 2). The capacity of this stockpile is of 100,000 tons.

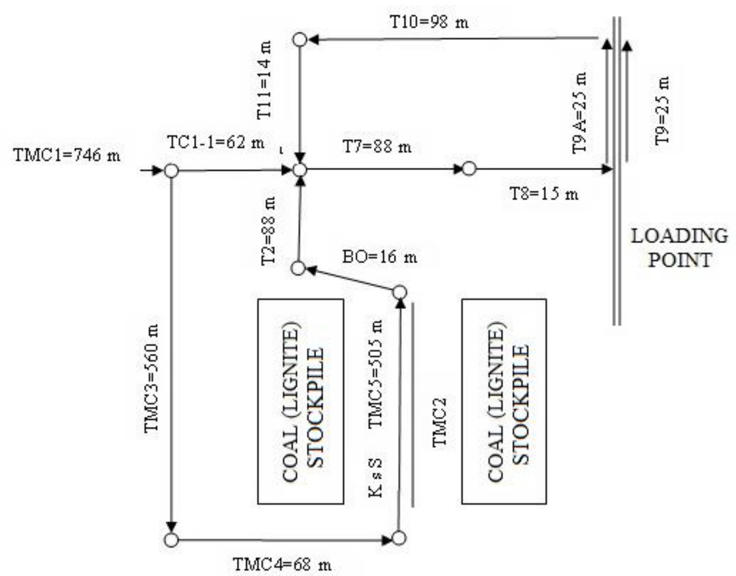

Figure 2. Technological flux in the coal stockpile of North Jilt open pit.

RESULTS AND DISCUSSION

In the open pits located in the area there are used three types of stockpiles: open pit stockpiles; intermediary stockpiles and final stockpiles, from where the lignite is delivered to the beneficiaries (figure 3). The total area occupied by the stockpiles exceeds 8 km^2.

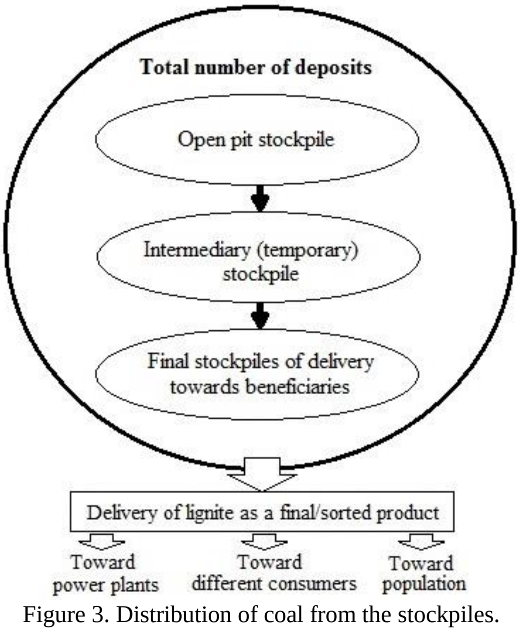

Figure 3. Distribution of coal from the stockpiles.

The efficiency of the storage and extraction operations of lignite from the stockpiles is influenced by the shape of the stockpiles and by the existing equipment, in conditions of limited investments in the mining sector.

As a result of the fact that the lignite layers have different calorific value (figure 4) in order to ensure a consistent quality of the product (lignite), it is necessary to maintain the homogeneity of the coal from the stockpiles. Following studies conducted in this regard, Chevron storage method was replaced by the Windrow method. In this method, the stacker moving on rails spills the school in parallel rows along the silo's length by changing the boom angle from the ground level, which allows the reconfiguration of the stockpile so as to facilitate input-output operations and maintain a consistent quality of coal which will be distributed to consumers.

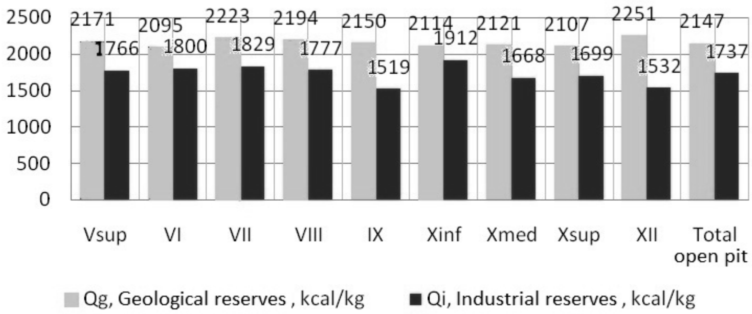

Figure 4. The quality of the coal.

The effective management of storage costs is influenced by the amount of lignite transported into stockpiles, the number and type of operations, the type and size of storage installations and the degree of mechanization and automation of lignite storage processes.

In this scope, there have been conducted several simulations to reconfigure the coal stockpiles, the end result of which is the adoption of the variant (solution) with three parallel stacks of coal, with simultaneous coal loading possibilities (figure 5).

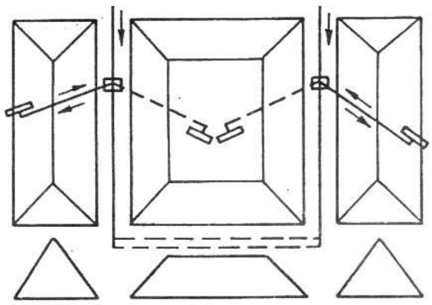

Figure 5. The variant with three parallel stacks of coal.

Using this storage option and the conducted homogenization allows maintaining the quality of the coal supplied to consumers. To pursue these goals all operations executed in stockpiles are monitored in real time.

CONCLUSIONS

Storage of coal in the stockpile is necessary to take care of any disriptions in the transport system or in coal mines due to which coal cannot be received at the power plant on such days. The general practice is to provide a 7-15 days stockpile in case of a pit head power plant depending on the reliability of the mines and the conveying system. In case the power plant is far away from the coal mines, coal stock of 30 days requirement will be provided.

Produced coal is generally loaded in trucks or wagons by excavators and loaders to be transported then to the storage areas.

Because the storage coal comes from different layers, whose calorific value is different, the homogenization of coal is necessary to ensure a continuous delivery process towards beneficiaries.

To increase the efficiency of the operations conducted in the stockpiles and reducing surface land affected their reconfiguration was necesary.

The significance of environmental factors largely depends on the design and geographical setting of a specific stockpile. To avoid costly delays due to permit complications, environmental factors should be considered during the early phases of site selection.

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