

DRAWING UP INTEGRATED MECHANIZATION STRUCTURES FOR HUMUS LAND RECLAMATION IN COAL MINING

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ABSTRACT

Integrated mechanization structures for land reclamation have been drawn up, analyzed and compared with existing ones for particular conditions of humus layer removal and technical reclamation at Maritsa East mines.

Mining and civil construction on agricultural land (categories 1-6) is carried out only after the humus layer has been removed in accordance with the Farm Land Protection Act. It is removed from the ground except in areas envisaged for afforestation, cemeteries, sanitary protection and other zones. When the humus layer thickness is less than 0.20 m, it is not removed. The humus layer stripped from lands and planned for constructing mines, quarries and engineering structures, is used for reclaiming those lands or other disrupted ground.

The conditions under which the lands are disturbed predetermine the application of various integrated mechanization structures for land reclamation.

The concept **integrated mechanization structure** for land reclamation involves the integration of various types of machines required for the humus layer removal and technical reclamation. According to Rzhetski (1968), integrated mechanization structures are formed on the basis of maximum integration of the *output and power* parameters of each machine with observing the technological requirements to the implementation of technical reclamation.

On the basis of observations and analysis of the conditions and factors for implementing the technical and biological

reclamation in open-pit coal mines in Bulgaria and abroad, we can draw up the following integrated mechanization structures for land reclamation under Bulgarian conditions of humus layer removal within the open-pit mine (Fig. 1).

Fig. 1 shows that the integrated mechanization structure generally involves a set of serially produced mining, construction and load-haul-dump machines used for removing, loading, transporting and spreading the humus material. The complexity of selecting the integrated mechanization structure results from the possibilities for applying various types of mechanization with continuous and cyclic operation.

The reclamation of disturbed ground is carried out by two schemes: direct and indirect (Fig. 2).

The integrated mechanization structures in the first scheme include combinations of basic machines with continuous operation. They permit the selective overburden and humus layer removal with simultaneous spreading over reclaimed ground. This scheme requires the storage of humus directly on the ground or in temporary humus sheds. When using tractor mechanization (bulldozers, scrapers, graders, etc.), intermediate humus sheds are often established where the soil is loaded and transported to the reclaimed land areas (Fig. 3).

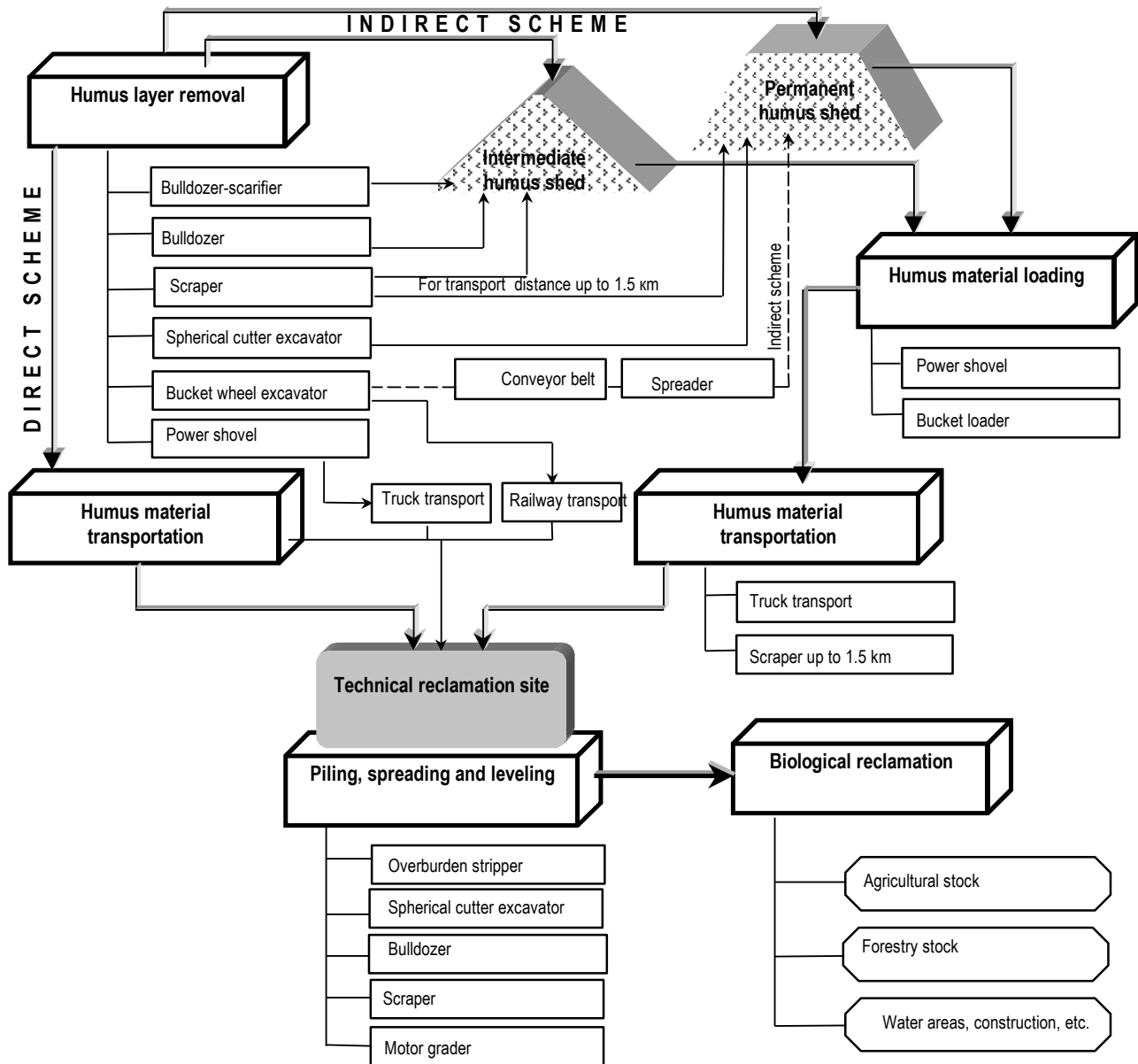


Figure 1. Integrated mechanization structures for humus layer reclamation of coal basins

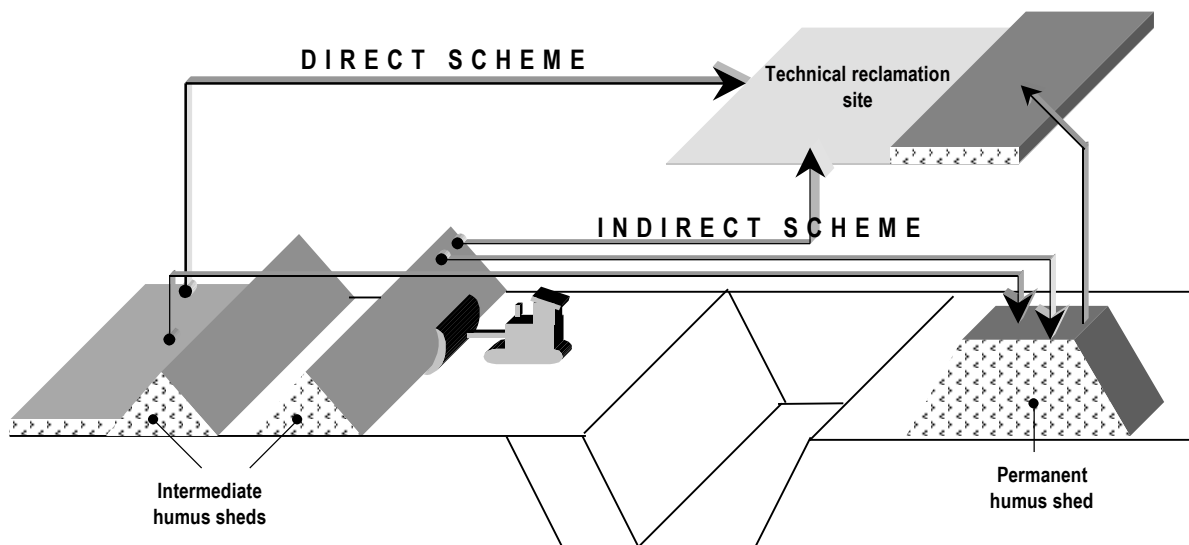


Figure 2. Direct and indirect schemes of technical reclamation

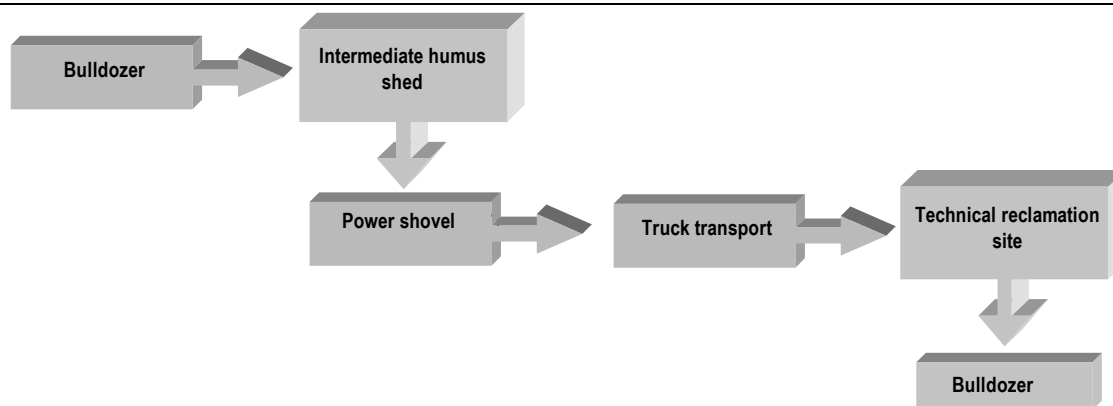


Figure 3. Integrated mechanization structure with establishing intermediate humus sheds for the indirect reclamation scheme

The efficiency of excavation, dumping and reclamation works decreases when using tractor mechanization with increasing the transport distances to the reclaimed areas. This problem has been identified particularly in reclaiming the disturbed ground of Maritsa East mines. Its solution is based

on using mining mechanization for removing the humus layer. As a result, specific integrated mechanization structures have been drawn up for those conditions (Figs. 3 and 4).

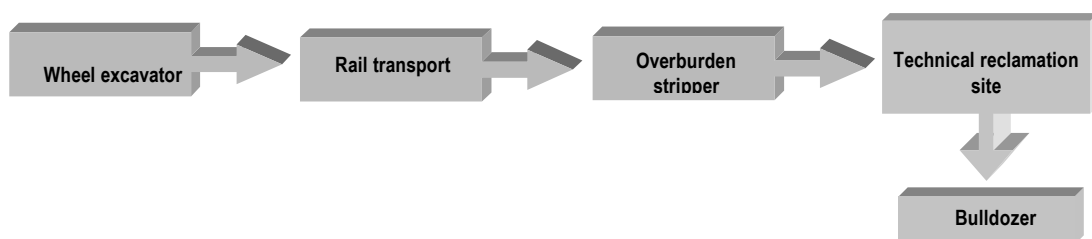


Figure 4. Integrated mechanization structure using basic mining machines and railway transport



Figure 5. Integrated mechanization structure using basic mining machines and conveyor transport

Serious problems for the reclamation works are the irregular distribution of the potentially fertile and fertile soil volumes in time and the lack of lands ready to be reclaimed. During the first coal mine development stage the humus removed is maximum in volume. At that stage there are no conditions for implementing and completing the whole set of reclamation

works. This circumstance calls for the need to build temporary humus sheds (indirect scheme – Fig.1), which determines the formation of new integrated mechanization structures. They involve both ancillary and basic mining mechanization depending on the particular conditions (Fig. 5).

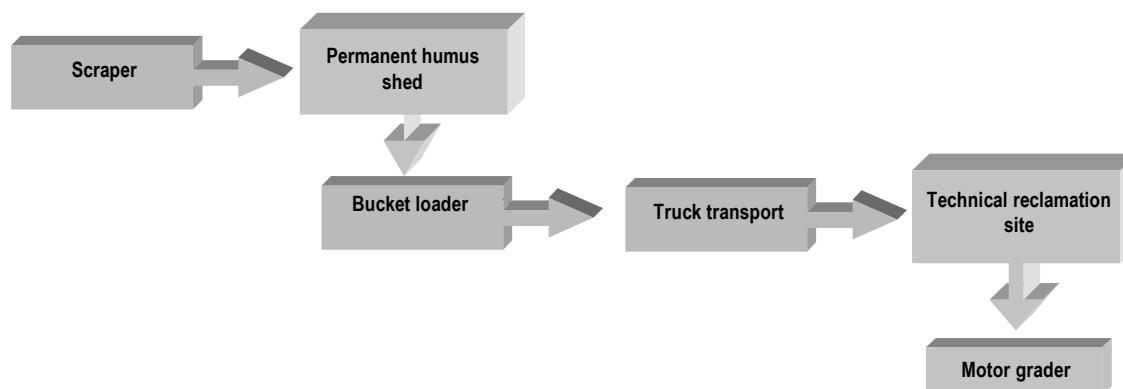


Figure 6. Integrated mechanization structure with establishing temporary humus sheds for the indirect scheme of land reclamation at Maritsa East mines

The proposed systematization of the integrated mechanization structures comprises the existing and prospective combinations of machines for performing basic operations in humus layer removal and technical land reclamation. It can be used both for drawing up new integrated mechanization structures and for analyzing and comparing the existing ones, by observing the following sequence:

- during the first stage of humus layer removal are included those structures that can be used depending on the technical, technological or natural factors and conditions;
- the variants of integrated mechanization structures are compared in terms of price, output, relative capital costs and energy consumption;

- a feasibility study of the integrated mechanization structures is carried out for the whole technical reclamation stage with rational qualitative combination and quantitative correlation of machines designed for removal, loading, transportation and utilization of the humus material; the most efficient variant is selected.

REFERENCES

- Rzhevski, V.V. 1968. *Technology and Integrated Mechanization for Open-pit Mining*. Nedra. Moscow (in Russian).

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