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Substantiation of Technological Parameters of Selective Coal Mining Technology

Selective coal mining technology involves the bidirectional and unidirectional schemes of separate coal and wall rock undercut extraction. The waste rocks are filled into the worked-out area by special horizontally-closed scraper conveyor when extracting a rock ledge.

Calculations were made for three variations of seam processing schemes – bulk and selective mining for one and two shearer passes to substantiate the main technological parameters of the technology. The main parameters of coal-face operations are shearer feed rate, daily output, ash content of extracted coal, rock yield for backfilling.

As a result of conducted calculations the main technological parameters and dependencies were obtained. Thus, with the use of selective coal extraction for two shearer passes, depending on coal and rock undercut thickness, the feed rate varies insignificantly from 3.1 to 3.4 m/min; for one shearer pass – from 3.9 to 6.5 m/min; with bulk mining the feed rate varies from 2.8 to 3.8 m/min.

Possible face output when using selective coal extraction per one shearer pass changes anywhere from 1047 t/day ($m_c = 0.65$ m) to 1340 t/day ($m_c = 0.8$ m), with the same thicknesses of the coal seams and two shearer passes the daily production is 1082 t and 1314 t correspondingly.

It was founded, that in case of bulk mining the increase of rock undercut size by 1 cm results in the additional increase of coal clogging by 1.1 – 3%, with selective extraction per one shearer pass – only by 0.7 – 0.85% and with the use of selective extraction per two shearer passes the thickness of rock undercut doesn't have any influence on the quality of produced coal. Therewith the ash content of produced coal within the limits of extracted coal thickness doesn't exceed 22.8% (with the use of bulk mining – 66.4%).

The waste rock volume for backfilling depending on the size of wall undercutting is from 508 m³/day to 750 m³/day. The length of the rock strip with the thickness of rock undercut of 0.6 m and panel width of 300 m varies from 250 m to 292 m. The degree of filling the worked-out space depends on the height of conveyor installation and varies from 18.5% to 64.9%. To increase the filling density of the worked-out space, additional devices are required to seal the backfill material.