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CENTRAL INTELLIGENCE AGENCY
INFORMATION FROM
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REPORT
CD NO.

COUNTRY	USSR	DATE OF INFORMATION	1951
SUBJECT	Economic - Coal		
HOW PUBLISHED	Monthly periodical	DATE DIST.	23 Apr 1951
WHERE PUBLISHED	Moscow	NO. OF PAGES	3
DATE PUBLISHED	Feb 1951		
LANGUAGE	Russian	SUPPLEMENT TO REPORT NO.	

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SOURCE Mekhanizatsiya Trudoyemkikh i Tyazhëlykh Rabot, No 2, 1951.

USE OF HYDROMECHANICS IN CHELYABINSK COAL MINES

Work carried out in 1950 in the Krasnosel'skiy coal pit completely confirmed the high effectiveness of hydromechanics in connection with mechanical breaking of the ground and also the possibility of using hydromechanics not only for removing soft material but also the more compact rock such as argillite and siltstone. All the earthwork in the construction of the Krasnosel'skiy coal pit was completed by hydromechanical means: pumps, mud pumps, and hydromonitors, working in connection with bulldozers. Removal of the overburden has now started.

The Krasnosel'skiy coal pit, located in the southern part of the Chelyabinsk Oblast and intended for working by the open-pit method, consists of a seam of lignite with a total thickness of 41.2 meters and a dip of 35-45 degrees. The roof and floor are made up of argillite and siltstone. The rock removed from the pit consists of sandy clay, consertal quartz sands, compact fire clays, siltstone, and argillite. The average thickness of the overburden is 9 meters.

The water supply for the hydromechanical operations is maintained by the repeated use of the water (in circulation). Additional water is obtained from the Uvel'ka River located 3,800 meters from the place of operations.

Three installations with 8NZ mud pumps and 160-kilowatt electric motors are in operation. The first and second installation have booster stations, each consisting of an 8NZ mud pump with a 160-kilowatt electric motor. Thus five 8NZ mud pumps and five electric motors are located directly in the pit. A hydromonitor is set up near each operating mud pump, and one bulldozer on an S-80 tractor is assigned to each mud pump.

The use of hydromechanics in connection with mechanical breaking of the ground was proposed by Prof N. D. Kholin. The chief feature of this method consists of a preliminary breaking of the ground by bulldozers so that the

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hydromonitors will not have to operate at such high pressure, the water consumption per cubic meter of ground removed will be decreased, and the productivity of the mud pump will be decreased. The chief advantage of using bulldozers instead of excavators is that bulldozers are more maneuverable, more economical, and more efficient.

Two methods of using the bulldozers have been employed in the pit. In one case, the bulldozer works a bench 5 meters wide, cutting a 10-15 centimeter layer. The blade in this case moves along the length of the bench and drops the cut ground over the side down the slope. Work by this method is effective only if the bulldozer has two blades or if the width of the strip to be cut is equal to the bulldozer's tread, that is, 2.8 meters.

In the second method, the bulldozer operates at a right angle to the bench, moves the cut ground to the edge of the bench, and dumps the ground down the slope of the excavation. With the blade slightly raised, the bulldozer then moves back to its former position. Using this method, the productivity of the bulldozer varies greatly depending on the sort of ground being cut, the distance the soil is to be transported, and the angle of the dip of the mine face.

The hourly productivity achieved by this method is shown, in cubic meters, in the following table:

Hourly Productivity (in cu m)

Angle of Dip of Mine Face (in deg)	Type of Ground	Transportation Distance (in meters) 10	20	30	40	50	60	70
Up to 8	Sandy	162.0	91.3	--	--	--	--	--
Up to 8	Fire clay, sands, top soil	50.0	35.0	22.5	17.5	15.0	--	--
Up to 8	Compact clay, sands, top soil	120.0	80.0	62.0	45.0	35.0	28.5	23.7
8-10	Same as above	109.0	76.5	57.5	43.0	35.0	28.5	23.8
10-12	Same as above	96.0	72.5	55.0	41.2	33.7	27.5	23.1
12-14	Same as above	87.5	63.6	50.0	37.5	30.0	22.5	20.0
14-16	Same as above	72.5	47.5	33.7	25.0	18.8	--	--
Up to 18	Sandy	72.5	47.5	33.7	25.0	18.8	--	--
16-20	Sandy	108.0	75.0	57.0	--	--	--	--
20-25	Sandy	87.0	62.0	49.0	--	--	--	--
Above 25	Sandy	71.0	46.0	32.0	--	--	--	--

The average work figures for the three mud pumps during three quarters of 1950 are given in the following table (the first and second pumps were used mainly for auxiliary operations and could not be exploited at full capacity):

	Yr Plan	9-Mo Performance
Year volume of stripping (in 1,000 cu m)	500.0	676.9
Year performance of 8NZ installation (in 1,000 cu m)	230.0	226.0
No of mine-face installations operating	2.25	3.0
No of hours actually worked by mine-face mud-pump installations	--	9,424
No of hours of mining operations per installation per 24 hr	--	20.2

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	Yr Plan	9-Mo Performance
Average daily performance per 8NZ installation (cu m)	--	1,455
Average hourly productivity per 8NZ installation (cu m)	--	71.8
Shift performance per miner (cu m)	--	56.4
Consumption of electricity per cubic meter (kw-h)	--	6.98

The third installation worked only at the removal of overburden and its performance from 1 October 1949 through 1 October 1950 was as follows:

Year performance (in 1,000 cu m)

Plan	230
Actual performance	350
Mining time per day (hr)	22
Daily performance (cu m)	2,000
Hourly performance (cu m)	91
Shift performance per worker (cu m per worker)	135
Shift performance of brigade in charge of installation (cu m)	225

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