THE IMPACT OF COAL OPENCAST MINING ON THE ENVIRONMENT IN ROMANIA

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ABSTRACT

Areas affected by surface coal mining activities in the Jiu Valley Basin and the particular aspects regarding the stability rock of the waste dumps are discussed.
The sources of water, atmosphere and soil pollution, the evaluation and monitoring of effects and the objectives for reducing the pollution of the environment are exposed. The above mentioned facts show that mining activity has a strong impact on the environment and the negative aspects have to be studied with the most efficient measures for diminishing them are to thoroughly analyzed.

INTRODUCTION

One of the highest priorities which affects generally the coal mining field in Romania, especially in the Jiu Valley Basin, is the environment protection. This problem gets more important as a consequence of a great number of underground openpit exploitation shutting down. The exploitation and the coal processing from the Jiu Valley Basin, the largest coal basin in Romania, are carried out in 21 industrial units. The industrial activities carried out in these units bring forth to a negative impact upon the environment.

The mining of pit coal in the Jiu Valley is being carried out underground, but there were a number of small openpits were the reserves in the outcrops of seam 3 in the mine fields: Câmpul Iui Neag, Lupeni, Petrila Sud and Lonea- Jiet were mined.

Although they represented a small share in the basin output, their impact on the environment, especially on the soil and on the landscape has been particularly harmful.

The hard coal has a large ash content (44 per cent) and thus coal dressing is an imperative. The coal dressing processes entail the formation of dumps and slurry ponds while the waste waters are discharged into the Jiu River. The above mentioned fact show that mining activity has a strong impact on the environment and the negative aspects has to be studied.

SURFACES AFFECTED BY MINING DUMPS

As a result of the activity carried out at underground and at opencast mining plants there results a large amount of waste that has to be deposited in waste dumps. Currently there are 41 waste dumps in the Jiu Valley, 23 being in operational and geomechanical elements of these waste dumps are rendered in the Table 1.

The waste dumps are generally located on mountain slopes or along valleys with or without hydrologic condition. Waste deposition in valleys has led to the formation of lakes in the riverbeds or from rainfalls. The occurrence of such lakes is geomechanically unfavourable. The water seeps, causes the phenomenon of suffusion modifies the physical-mechanical properties of the rocks in the waste dumps and in the soil, being about landslides or plasic flows eventually.

The estimation of waste dump stability has been done function of RMR criterion put forward by Bieniawski (1983) and that suggested by Barton (1974). The data for the dead rocks in the waste dumps analysed are rendered in Table 2.

no.	Mining plant	Waste dump denomination	Waste dump volume [m³]	Area taken up by the waste dump [ha]	Area of influence zone [ha]	Length [m]	Width [m]	Height [m]	Dip	Foundation soil	Stability criterion	
									Slope [grade]	[grade]	RMR	Q
1	Lonea	Jiet	24.080	0.57	0.4	140	30-50	2-7	8-13	5-22	55	5
		Lonea I	125.085	1.49	0.38	160	90-100	14	14-30	10-15	45	4.5
		Defor	2.149.970	12.65	1.05	220-540	195-520	5-40	5-8	13-30	55	4
		Valea Lui Ciort	960.472	7.19	1.11	140-340	210-290	30	5-20	10-30	55	6
		Valea Arsului	200.000	2.1	2.5	175	39-55	12-15	14-20	8-25	47	5
2	Petrila	2 Est	308.000	2.1	0.3	320	80	14-20	5-67	8-15	57	7
3	Petrila Sud	Put 4	52.300	1.3	0.1	80-140	60-85	3-7	8-60	1-5	52	5
		Microcariera	974.025	7.8	1.2	540	90-260	10-22	3-40	1-3	58	6
4	Dalja	Pa-1	63.000	1.74	0.3	85	30-70	5-10	5-17	8-20	40	9
		Plan Dalja	280.000	1.74	0.25	215	30-150	5-40	7-15	10-35	45	4
		Pa-1; Pa-2	1.221.400	7.9	4.8	350-500	50-550	10-45	8-35	10-23	49	4.5
		Tericon	77.500	1.2	0.2	148	120-150	8-15	10-18	5-20	48	4
5	Livezeni	Pa-1; Pa-2	290.000	2.15	0.7	250	100-150	4-11	5-12	10-25	40	3
		Put Auxiliar	200.000	1.55	0.3	147	50-350	4-10	4-20	8-19	39	2
6	Aninoasa	Tericoane-Piscu	1.474.446	7.418	3.42	230-700	30-450	5-45	18-35	10-30	42	5
		Sud	144.966	0.735	0.34	121	30-155	2-10	10-42	8-35	44	4
7	Vulcan	Put 7 Vest	270.000	9.1	7.6	315	50-270	3-12	8-25	11-19	50	5
		Tericoane	1.607.044	6.3	8.0	200-475	40-550	8-35	15-30	12-35	43	7
		Valea Arsului	22.500	0.3	—	48	70	2-5	7-12	5-30	48	5
8	Paroseni	Valea Lupului	419.200	2.8	0.5	230	40-160	6-30	10-58	2-6	43	4.4
		Funicular	135.000	1.17	0.4	160	40-90	10-14	17-39	1-5	41	3
		Tericon	219.600	1.37	0.1	160	110	3-8	15-40	0-15	49	5
9	Lupeni	Ileana 1	4.283.656	14.26	0.04	349	150-350	8-35	10-35	8-14	55	6
		Ileana 2	1.091.150	4.61	2.12	700	240	4-15	18-31	5-30	50	5.2
		Victoria	11.751.385	2.48	0.02	500	200	5-20	28-34	4-25	48	6
		Victoria 2	2.875.272	6.69	2.62	350-600	35-400	4-25	10-40	15-30	47	7
10	Barbateni	Mierleasa	221.317	2.7	0.3	75-90	25-80	6-15	8-23	5-19	42	4
		Galerie Coasta	1.539	0.2	0.01	10	20-75	4-18	11-35	8-24	50	3.8
11	Uricani	Funicular Vechi	1.000.000	11	3	250-300	50-90	9	10-45	5-15	49	4.1
		Funicular Nou	67.000	2	3	235		3-4	8-15	4-20	55	3
12	Valea de brazi	Funicular	11.500	0.15	0.3	243	70-80	6-15	24-60	7-35	60	2
		Put 8	2.400	0.04	0.01	170	180	10-30	60-69	5-20	54	1
		Balomir	230.000	2.18	0.6	780	120-200	10-40	12-71	0-10	47	3.5
13	Câmpu lui Neag	Poiana Mare	1.619.000	9.6	0.45	640	100-210	10-25	20-44	0-3	44	4.1
		Sesul Serbanilor	1.516.500	8.6	1.38	720	75-320	10-32	37-47	8-14	49	5
		Frasin	890.000	6.8	2.1	180	250	10-31	12-64	2-14	52	5.6
14	E.P.P.	U.P. Petrila	2.800.000	25.5	4.0	100-150	500-900	10-40	—	5-10	39	5
		U.P. Livezeni	200.000	2.5	0.7	200	50-120	4-12	—	0	38	3
		U.P. Coroiesti	3.300.000	16.5	3.25	150-200	340-550	60-78	—	0-2	38	3
		U.P. Lupeni	3.700.000	22.1	2.0	125	90-250	10-30	—	0-5	39	2
		U.P. Uricani	100.000	0.1	—	—	—	—	—	—	—	—
TOTAL			36.901.237	218.683	59.85							

Table 1. Geometrical elements and the assessment of waste dump stability.

RMR Global Bonus	81- 100	61- 80	41- 60	21- 40	< 20
Rock grade	1	2	3	4	5
Degree of rock stability	Very stable	stable	Average stable	Unstable	Very unstable

Table 2. Classification of rocks according to Bieniawski-RMR.

The classification in various grades of stability according to the criteria is done according to tables 2 and 3.

Parameter value Q	Degree of rock stability
$10^{-3} - 10^{-2}$	Exceptionally low
$10^{-2} - 10^{-1}$	Extremely low
10^{-1}- 1	Very low
1- 4	Low
4 - 10	Average
10- 40	Good
40- 100	Very good
100- 400	Extremely good
400- 1000	Exceptionally good

Table 3. Classification of rocks according to Barton.

From the analysis of the parameters RMR and Q calculated and rendered in Table 2 we can conclude that waste dumps belong to the category of low stability rocks, 6 cases and of average stability, 35 cases.

THE IMPACT PRODUCED BY MINE YARDS

In order to carry out current activities, mine yards have been arranged for each small open pit or mine. The area of these yards is approximately 192 ha. Access roads, assemblage platforms, warehouses, and social facilities represent other areas taken up but the mining activity in the basin. These are considered to occupy 80 hectares. Approximately 500 hectares out of the area of the mining basin Petrosani are taken up by mining activities, which represents 3.5 % of the total area of the basin.

If we also add to this, the weathered areas, withdrawn from the economic circuit, as a result of the impact of underground mining on the ground surface it can be estimated that 5% of the basin area is affected by mining industry.

Originally the areas affected were represented by: 96% land for agriculture, consisting of meadow-land and pastures, 3% stock of wood and 1% built up ground.

MEASURES FOR COMBATING ENVIRONMENTAL POLLUTION

- The waste dumps and the former small, openpits should be brought back to their original use. This is being done timidly with the 18 waste dumps in conservation.
- Environmental pollution should be diminished by planting brush on waste dumps to prevent dislodging fine rock particles.
- The former small openpit could be included in the tourist and fishing circuit.
- Waste dump stability has to be ensured by taking measures of constructional and maintenance character.

Plans should be drawn up for waste dump deposition and stability studies should be done for the waste dumps at dressing plants which belong to the category of unstable rocks as it is shown in Table 1. The existing waste dumps should be reinforced.

The water courses and streams undercrossing wastedumps should be drained and controlled.

The new concept has to be adopted regarding the returning to the agriculture circuit of the areas taken up by waste dumps. Urgent and realistic measures were applying from an economic and technical viewpoint so as to allow the local population to resume the old pursuits and occupations specific to the zone.

CONCLUSIONS

The mining activity reorganisation causes serious social and economical problems. A most important priority from this point of view, is the ecological recover of the mining areas.

Under the present legislation, the Hard Coal National Company Petrosani has conceived the plan of environment policy, which is a flexible and realist one, meant to be included among the Government policies it is based.

Upon the identification of all the actives and problems which define the impact of this activity to the environment and their evaluation, using previous observation, during long periods of time. It is very important to put into practice the papers referring to the possibilities to rehabilitate the environment and those about the impact upon the environment of the mining units belonging to CNH Petrosani, concerning the underground and surface activity.

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