

## STUDY ON MONITORING SEDIMENTABLE AND SUSPENSION POWDER IN THE AREA COAL DEPOT ROSIUTA

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**ABSTRACT:** The present work shows the dimensions of the pollution caused by the mining activities within the Roșiuta quarry. The negative impact of mining activities on the environment is a direct one, which is strictly related to the actual extraction of the deposits of useful mineral substances and the other indirectly, related to the mineral processing activity. Surface mining is a source of dust pollution throughout its life, from the moment the land surface began to be disturbed until the entire surface was again covered by vegetation. The surface exploitation activity of the lignite developed in the Roșiuta quarry is the main source of air pollution, especially with suspended powders and sedimentable powders. The excavated coal has a low mechanical resistance, to which low humidity is added, especially in hot weather. leads to the formation of powders. The air quality in the area of influence of the mining perimeter is mainly affected by the technological processes in the quarry, the dump and the coal deposit, by the increase in certain points of the mining perimeter of the concentration of powders.

**KEY WORDS:** Roșiuta quarry, coal deposit, sedimentable powders, suspended powders

### 1. INTRODUCTION

Roșiuta quarry, is located within the Roșiuta I mining perimeter, on the territory of Matasari, Slivilesti and Dead City communes in Gorj county.

The Roșiuta mining area is delimited as follows:

- \* to the north, by the Roșiuta II mining perimeter;
- \* to the south, by the mining perimeter of Ploștina;
- \* to the east, by the mining perimeter Jilț Nord, Jilț Sud, respectively Runcurelu village;
- \* to the west, the Lupoia mining perimeter, respectively Roșiuta village.

The effects of the change of the air quality, caused by the works in the Rosiuta perimeter will materialize by the possible increase, at certain points of the mining

perimeter, of the concentration of powders, gases and fumes resulting from the development of the technology in the quarry.

The most important manifestation points are:

- in the excavation area;
- in the landfill deposit area;
- at the points of discharge of the front lanes on the connecting lanes;
- at the distribution nodes;
- at the deposit of the coal in the deposit and its shipment;
- on access roads.

Another potential source of air quality alteration is the self-ignition of coal from deposits or from career layers. Due to incomplete combustion, carbon dioxide and small amounts of sulfur dioxide, light hydrocarbons are released into the air - toxic substances whose concentrations do not usually exceed the permissible limits.

The coal deposit serving the quarry was located in the perimeter of the quarry, in Rosiuta, near the national road DN. The coal to the distribution point (distribution node), is transported on the transport circuit made up of strips in repavable construction located on the quarry floor and on the quarry stage that connects the distribution node with the excavation step. From the distribution node the coal is transported on the transport bus, consisting of conveyor belts in fixed construction, to the coal deposit, located in the western limit of the quarry at approx. 50-100 m from the households of Rosiuta village.

The coal is deposited in the warehouse by means of the ASG and KSS machines and the shipment to the loading point is done by the KSS type machine. In addition to the factors listed above that lead to the formation of dust, there is also the addition of coal from the deposition machine and its discharge from about 5-10 m high, the servant following the descent, respectively the raising of the corresponding arm with the increase of the deposition cone so that the distance between the tip of the cone and the spill body of the strip should be as small as possible.

In the immediate vicinity of the Roșiuta deposit there are about 100 households located at distances between 25 m and 200 m. From the point of view of the emission of sedimentable powders and of the powders in suspension, the sources of pollution are diffuse and are represented by the transport of coal with conveyor belts (linear source), the loading of coal linings with coal and the entrainment by the air

currents from the stack. coal (surface sources).

In order to quantify the dust concentrations, the Gorj Environmental Protection Agency carried out measurements at the indicators: sedimentable powders and suspended powders (PM10) during the year 2018 in the area of influence of the Roșiuta coal deposit.

The determination of the powders in suspension was carried out according to the method stipulated in STAS 10813/1997. The principle of the method consisting of suction of an air volume between 0.45 - 1.5 m<sup>3</sup> on membrane filters with pore size of 0.8-0.85 μm. The diameter of the membranes is 47 mm and the suction interval chosen was 30 minutes. For this suction interval, Order no. 592/2002, regarding the quality of the air provides a maximum allowed concentration (C.M.A.) of 50 50g / m<sup>3</sup> air / 30 minutes.

The determination of sedimentable powders was performed according to the method provided in STAS 10195/75. The present method of analysis refers to the determination of sedimentable powders in the atmosphere, the amount of powders that are deposited under the action of gravity, as well as those caused by precipitation. The method consists of collecting from the atmosphere in vessels with a known surface, within an established time interval and their gravimetric determination. The mediation period for STAS 12574/87 is 30 days, and the maximum allowed concentration (C.M.A.) is 17 g / m<sup>2</sup> / 30 days.

## 2. MONITORING OF SEDIMENTABLE POWDERS

Monitoring the sedimentation powders, resulting from the loading, transport and storage activities from the coal deposit of Roșiuta quarry was carried out in measurements made in 2018 in two measurement sections.

The first sampling point (sample code RjPsd1) was located in Roșiuta village at a distance of 100 m in the direction of SV from the coal depot in the garden of a local, and the second point (sample code RjPsd2) was located at a distance of 50 m in the NE direction from the coal deposit to the town of Motru.

The results regarding the measurements of sedimentable powders

carried out in the area of the Roșița coal deposit in 2018 are presented in table 1.

Table 1. Concentration measured at sedimentable powders in the Rosiuta quarry area

The sampling period	2018		C.M.A.
	Sampling sections		STAS 12574/84
	RjPsd1	RjPsd2	
January	15,19	23,96	17 g/m <sup>2</sup> /month
February	20,74	19,38	
March	24,6	51,36	
April	18,14	32,76	
May	22,41	48,12	
June	24,72	59,23	
July	29,48	12,55	
August	23,82	25,06	
September	23,82	50,23	
October	35,76	21,33	
November	14,77	48,35	
December	15,93	33,81	

Observing the graphical representation of the measured concentrations in fig. 1 of the two measurement sections it is observed that the highest concentration measured in item no. 1 (sample code RjPsd1) was registered in October (35.76 g / m<sup>2</sup> / month), which is 2.10 times the maximum allowable concentration

The minimum concentration was recorded in November (14.77 g / m<sup>2</sup> / month) and represents 86.88% of the maximum allowed concentration.

And in point no. 2 (sample code RjPsd2) of the 12 measurements made in 2018, 11 exceeded the admitted limit value, thus achieving a frequency of exceedances of 91.66%. The highest value was recorded in June (59.23 g / m<sup>2</sup> / month), which is 3.48 times above the maximum concentration allowed, and the lowest was recorded in July (12.55 g / m<sup>2</sup> / month), representing 73.82% of the maximum allowed concentration.

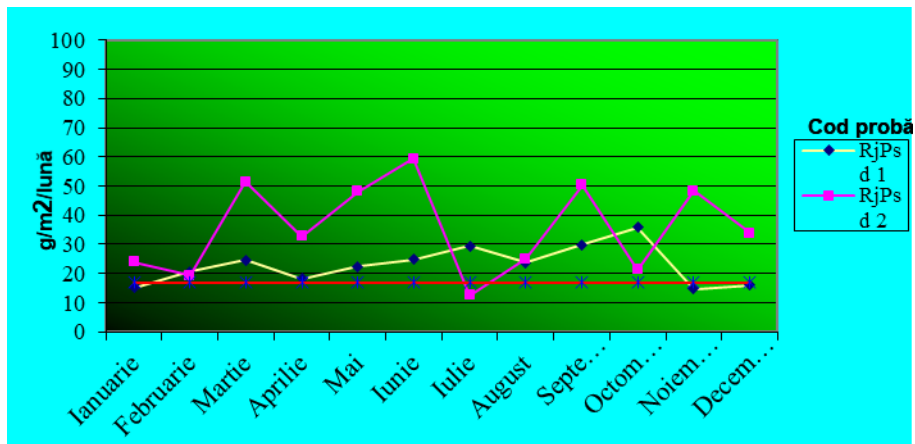


Fig. 1. Variation of the concentration of sedimentable powders in the area of the Roșița coal deposit in 2018

### 3. MONITORING OF POWDERS IN SUSPENSION

Monitoring the suspended powders, the PM10 fraction in the area of influence of the Roșița coal deposit was made by taking air samples from four distinct points. The values of the measurements made for powders in suspension (PM10) are presented in table 2. In the light of the obtained results, some conclusions can be made regarding the

pollution with powders in suspension (PM10) of the area of influence of the Roșița coal deposit.

In point no. 1 (sample code RjPsu1), located in the immediate vicinity of the coal deposit, the values measured in the two sampling periods, were above the maximum allowed value, this being 3.67 times and 3.3 times higher than respectively the allowed limit (fig. 3.7).

Table 2. Concentration of suspended powders from the Roșița coal deposit area in 2018

Sampling sections	Period	Measured concentration period [ $\mu\text{g}/\text{m}^3$ ]	C.M.A. according to Order no. 592/2002
RjPsu1	Iunie	183,85	50 $\mu\text{g}/\text{m}^3$
RjPsu2		128,6	
RjPsu3		175,26	
RjPsu4		120,16	
RjPsu1	Noiembrie	165,4	
RjPsu2		102,6	
RjPsu3		149,6	
RjPsu4		116,4	

In point no. 2 (sample code RjPsu2), which was located in the same direction, but at a distance greater than point no. 1 (sample code RjPsu1) measured concentrations had lower values. In June, it was 2.57 times higher than the maximum value allowed, and in November it was 2.05 times.

Item no. 3 (sample code RjPsu3), located at NV relative to the warehouse, the

values measured in the two periods show exceeds the normal values. Thus, in June this was 3.5 times, and in November it was 2.99 times higher than the maximum allowable concentration.

In point no. 4 (sample code RjPsu4), in June, the concentration of PM10 measured exceeded 2.4 times, and in November it was 2.32 times above that.

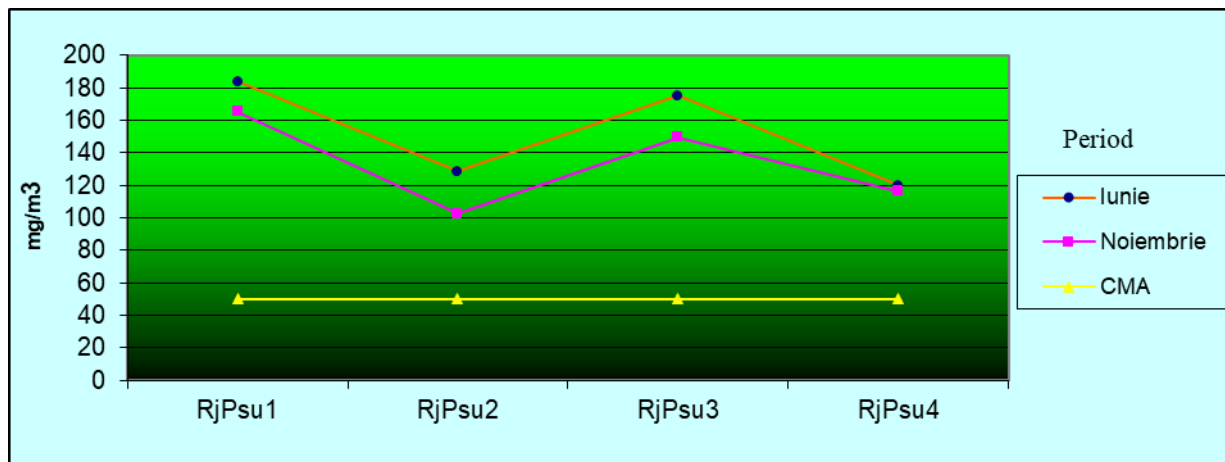


Fig. 2. Variation of the concentration of powders in suspension (PM10) in the area of the Roșița coal deposit in the two measurement periods of the year 2018

## CONCLUSIONS

The impact of the coal deposit is manifested mainly on the quality of the air, for which the sedimentable powders were monitored and in suspension, the following being noted:

- in the case of sedimentable powders, 11 measurements exceeded the admitted limit value, achieving a frequency of exceedances of 91, 66%.
- in the case of powders in suspension, the PM 10 fraction is found to be considerably exceeding the maximum allowed limit.

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