

STUDIES ON SOIL AND NOISE POLLUTION IN THE COAL DEPOSIT OF ROȘIA CAREER

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ABSTRACT: Mining consists of the extraction of minerals in order to use them according to the needs of different sectors of national economy. Mining and quarrying mining starts with the prospecting and exploitation of deposits - complex activities and of a high technical level, followed by the opening and operation of the deposit, i e the extraction of the mineral substance and its bringing up to date in order to be used in the form that is found in the deposit, or after a preliminary processing.

Keywords: Rosia career, deposit of coal, soil, noise.

1. INTRODUCTION

Rosia Jiu career is located on the coal field of Rovinari, 30 Km from the town of Targu Jiu. Access to the area is via the national road DN 66 Filiași - Tg. Jiu with a linked road in Rovinari and Vlăduțeni and via the county road DJ 674-Farcasesti-Vlăduțeni Turceni. Rail access to career includes railway Filiași - Turceni - Rovinari - Tg-Jiu (route Bucharest - Simeria), linked to the station and station stop Vlăduțeni Rovinari.

The coal deposit is located in the north of the quarry between the village Farcasesti and the town Rovinari and is sized to store up to 60,000 tons of coal breeze. From Rosia exit from warehouse to the entry to CET Rogojelu warehouse the bands cross the main town of Rosia Jiu on a distance of about 1.9 km, being located at a distance of a maximum of 90 m from the houses of over 100 households in the area.

In the immediate proximity of the Rosia deposit there are about 100 households at distances between 25 m and 200 m. On the northern side of the warehouse, the block of apartments in the town of Rovinari are at a distance of 35-90 m.

Deposit from Rosia career consists of two rows stacks of coal. String stack is

placed parallel to the village Farcasesti and belongs to Rovinari Energy Complex, and the sequence of stacks which is located to the town of Rovinari belongs to the National Society of Lignite Oltenia - sub EMC – Rosia Career, a rate of 20%, the rest being owned by Rovinari Energy Complex .

2. EXPERIMENTAL

All reagent involved in this study (65% HNO₃, 32 % HCl) were of purris p.a. quality. All of them were purchased from Merk Chemistry Co. Ltd. The ICP Multielement Standard Solution IV was used to calibrate the ICP spectrometer.

In order to establish the heavy metals charging degree of the soil around the thermal station, there were taken samples on several cardinal directions and at different distances from the thermal station, being considered a potential pollution source with heavy metals. There were taken samples on two depth profiles: 0-10 cm and 10-20 cm, on a three years period: 2015 and 2016.

The metals distribution in the top layer of soil is important in relation to the bioavailability for plants and the risk to enter

the food chain. Soil samples were first pretreated. They were dried in air at room temperature for one week. After that the samples were crushed, and sieved by using a nylon fiber sieve (2 mm) to remove stones.

25000 g sample of soil pretreated was soaked in a volume of 1 ml distilled water, and it was transformed into a slurry in a reaction flask. Then 7 ml of 32% HCL followed by 21 ml of 65% HNO₃ were added drop by drop to reduce foaming. The sample was allowed to stand for 16 h at room temperature for low oxidation of the organic matter of soil.

After cooling at room temperature, the sample was transferred into a 100 ml graduated flask with 2% HNO₃.

The experimental determinations were carried out in the Laboratory of the Environmental Protection Agency Gorj. Soil

Values were determined by direct measurement with metrology equipment checked and calculated according to the standards:

- ISO 1996-1:1982 Acoustics. Description and measurement of environmental noise. Part. 1: Basic quantities and procedures;
- ISO 1996-2:1987 Acoustics. Description and measurement of environmental noise. Part. 2: Acquisition of data pertinent to land use;
- ISO 1996-3:1987 Acoustics. Description and measurement of environmental noise. Part. 3: Application to noise limits;
- ISO 9613 Outdoor sound propagation

Sound level measurements were performed with filter type A. three measurements were carried out day and night, in every measurement point. The sound level meter targets were placed in front Protected (houses in the village of Farcasesti). The distance to the protected targets was of 3 m and 1.5 m distance from the ground.

Obs: - results shown are the average calculated according to:

samples were taken from potentially polluted location (deposits of oil, transformer) with PCBs.

The program of soil sampling according to ISO 5667-1: 1993.

- sample collection in special lab dishes.
- Documentation of sampling by tagging vessels.
- transport of samples in cooler.

For soil sampling at predetermined depth probe was used pedologically. The location of the sampling point was taken into account as of possible accidental spills of oils containing PCB Electrical. The soil sampling was carried out using a probe that allowed the removal of soil from the default depths. The techniques used to determine pollution indicators are instrumental techniques based on gas chromatography method coupled with mass spectrometry.

$$L_{Aeq} = 10 \cdot \log \left(\sum_{t_1}^{t_2} 10 \cdot \frac{t}{10} \right) \quad (1)$$

where: CR – 5 and CR – 6 no measurements of noise were carried out during the night because the noise sources (the conveyor) did not work.

3. RESULTS AND DISCUSSIONS

The pH and the heavy metals content from the soil around the coal deposit Rosia Career Rosia are summarized in table 1.

The interpretation of the obtained results was done according to the valid Romanian law, whose reference values are presented in table 2.

Table 1. Heavy metals content in soil near the coal deposit at Rosia career

Sampling point	2015					2016				
	pH	Cd mg/kg	Cu mg/kg	Zn mg/kg	Pb mg/kg	pH	Cd mg/kg	Cu mg/kg	Zn mg/kg	Pb mg/kg
2000 m N 0-10 cm	6.4	0.4	31.0	87.8	4.3	6.3	nd	30.1	87.0	10.0
2000 m N 10-20 cm	6.5	0.2	31.0	82.1	5.0	6.5	0.4	132.2	82.0	nd
300 m V 0-10 cm	6.2	0.2	45.0	139.0	6.1	6.5	nd	36.5	47.2	0.3
300 m V 10-20 cm	6.1	0.2	4.5	46.6	2.1	6.5	nd	27.0	156.2	0.2
1000 m SV 0-10 cm	6.3	0.2	20.1	122.0	10.5	6.4	nd	40.1	70.1	nd
1000 m SV 10-20 cm	6.5	0.2	48.0	110.5	5.2	6.4	nd	10.0	40.1	1.1
800 m SV 0-10 cm	6.5	nd	45.1	42.0	6.2	6.4	0.2	18.8	145.2	nd
800 m SV 10-20 cm	6.4	nd	44.2	38.8	2.0	6.3	nd	21.2	301.2	0.3
1500 m S 0-10 cm	6.4	nd	21.0	35.4	1.6	6.4	nd	32.2	152.0	3.1
1500 m S 10-20 cm	6.4	nd	17.8	36.2	nd	6.5	0.7	55.2	232.0	5.4

N, S, SE, SV – sampling directions; nd- not detected

Table 2. Normal values alert lever and intervention lever for soil

Metal	Normal value mg/kg	Alert level mg/kg		Intervention level mg/kg	
		Sensitive area ¹	Less sensitive area ²	Sensitive area ¹	Less sensitive area ²
Cu	20	100	250	200	500
Pb	20	50	250	100	1000
Zn	100	300	700	600	1500
Cd	1	3	5	5	10

¹Sensitive area: residential and agricultural

²Less sensitive area: commercial and industrial

There are no records of excesses of the alert or intervention levels for the sensitive usages type. The values obtained for pH of the soil from the area showed that coal deposit at Rosia Career is moderately acid. The data obtained showed that in case of copper and zinc in samples from soil around the coal deposit the Career Rosia excesses of normal values were recorded, and for cadmium and lead were recorded excesses of normal values only in one or two cases in one direction (N for cadmium and SV for lead).

These results emphasized that the soil around the coal deposit at Rosia Career was polluted with copper and zinc probably

because of the metals concentration in the burnt coal, and the highest values of the metal concentration registered in soil are due to the wind direction and wind speed.

[1] **Table 3.** PCB concentration measured in samples taken from the site

Section sampling	Concentrations determined	Concentrations normal	Concentrations alert threshold	Intervention threshold concentrations [mg/kg s.u.]
RD1	nb	0,01	1,0	5,0
RD2	0.035	0,01	1,0	5,0
RD3	nb	0,01	1,0	5,0
R1	5,04	0,01	1,0	5,0
R2	nb	0,01	1,0	5,0
R3	nb	0,01	1,0	5,0

[2] note: nd. below limit of detection is 0.001 mg for each component

Looking at the plot in Figure 1 note that out of the six sections of the sampling of soil, in the area standard of 1.0mg / kg dry matter for the use of less sensitive land. R1, the total concentration of PCB, is at the threshold of intervention, 5.04 mg / kg dry weight, but exceeding 5 times the maximum

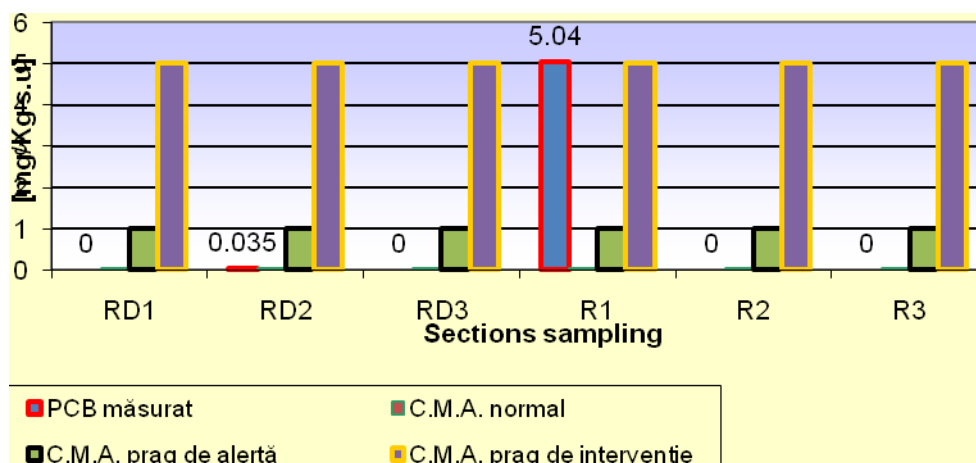


Figure. 1. PCB analysis results from soil

The measurement results (Table 4) performed Health Order no. 536/9. compared to those regulated by the Ministry of

Tabel 4. Results of equivalent noise level measurements

Nr crt.	Measuring point	The amount allowed at daytime	The amount allowed at night	The equivalent noise level measured at daytime	The equivalent noise level measured at night
1.	CR-1	50	40	59.8	52.3
2.	CR-2	50	40	50.2	48.3
3.	CR-3	50	40	51.6	47.2
4.	CR-4	50	40	53.2	48.1
5.	CR-5	50	40	68.0	-
6.	CR-6	50	40	61.1	-

The equivalent noise level exceeds the maximum allowed at protected receptors during the night at all points where measurements were made.

Daytime high values, with overruns of between 12-14%, are recorded in points CR-1, CR-5 and CR-6. In other sections where they performed measurements, noise equivalent overruns are smaller, being close to the limits.

The levels of noise from specific sources related to mining activity are evaluated in technology streaming (excavators rotor, conveyor carpet, rubber, machinery tailings and coal) and that in Batch (Shovels and means of automobiles).

CONCLUSIONS

The coal deposit is located in the north of Rosia career between the village of Farcasesti and the town of Rovinari and is sized for storing a quantity of 60 000 t of coal.

The impact of the carbon deposit on the soil and subsoil is evidenced by the total concentration of PCB that is at the threshold of intervention (5.04 mg / kg dry matter) but more than 5 times the alarm threshold of 1 mg / kg dry matter use of less sensitive land.

The measurements showed that the noise levels exceeded the levels allowed, especially during the day.

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