

THE ACTUAL STUDY OF AIR POLLUTION WITH PARTICULATE MATTER IN THE INFLUENCE AREA LUPOAIA QUARRY

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Abstract: The paper presents the current study of air pollution with particulate matters in the influence area of Lupoiaia quarry from Gorj county. The determination of the content of particulate matter was made according to the standard 10195/75. Considering the environmental location of Lupoiaia quarry, two sampling points were established for monitoring particulate matters, for two years, 2011 and 2012. The interpretation of particulate matter results was made in accordance with the provisions of the standard 12574/87. The measurement principle for particulate matters is based on putting the PM10 fraction on a nitrocellulose filter with $\Phi=47\text{mm}$, separated from the particles and on their gravimetric determination. Analysing the values achieved for air quality indicators resulted, we notice that they are different, which means that higher values resulted in the influence area of the coal deposit.

Keywords: air pollution, particulate, quarry

INTRODUCTION

Lupoiaia quarry is located in the north of Motru deposit on the territory of Motru and Lupoiaia, with the following limiting mines:

- in the north – Roșița mine;
- in the south – Prigoroiu mine;
- in the west – Lupoiaia mine;
- in the east Roșița quarry (Roșița).

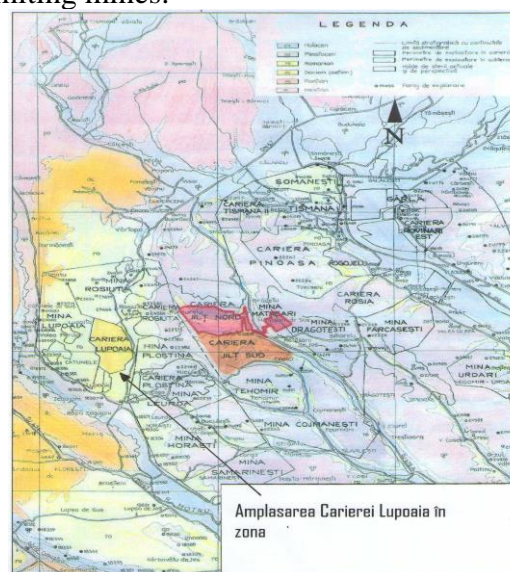


Fig. 1. Lupoiaia Quarry – placement in the area

Lupoia quarry uses “the mining method of partial transportation of waste rocks to the interior dump and transport to interior dumps” and “continuous excavation technology, transport and waste dump” by using excavation, transport and waste dumping plants. Considering the extension of Lupoia quarry from 2011 to 2027, the activity will comprise four major fields.[1] Air quality in the area is mostly affected by the technological process in the quarry, waste dump and coal deposit. This paper presents the current stage of air pollution with particulate matter in the influence area of LUPOAIA quarry

EXPERIMENTAL

The determination of the air particulate matter content is made according to the standard 10195/75. Air purity. Determining particulate matters[2].

The method consists in collecting the atmospheric matters in vessels with a known surface, within a determined period of time and their gravimetric determination. For matter collection, the standard recommends the device in figure 2

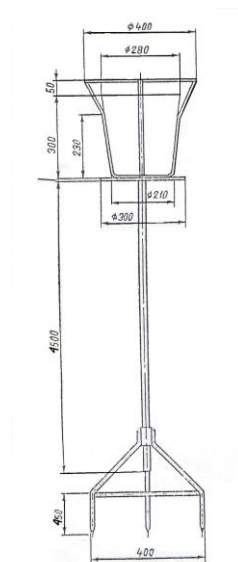


Fig.2. Particulate matter sampling device

During the cold period of the year, in order to prevent the collection tanks from freezing, distilled water will be replaced with a mixture of distilled water and ethylic alcohol, in proportion of 3:1 vol. during the warm period of the year, in order to prevent microorganisms to occur, especially algae, copper sulphate will be added in the distilled water from collection tanks.

Considering the location of Lupoia quarry, only two points were established for monitoring particulate matters.

P1 – located north-west from the quarry, close to some houses. These houses are 300 – 350 m from one of the conveyor belts

itineraries. The other collection point (P2) was located close to its deposit, at approximately 50 m.

Results and discussions

The interpretation of particulate matters results was made in accordance with the provisions of standard 12574/87[3]. Therefore, in 2011 in collecting point P1, of 12 measurements performed, two excesses of the maximum admitted concentration were recorded, which is a frequency of excesses of 16%. (Fig. 3.).

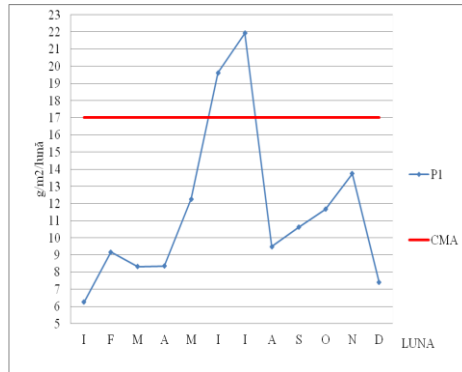


Fig.3. The variation of particulate matters concentrations in point *P1* (2011).

They were recorded in June and July. In June, the concentration of particulate matters was 15,4% over the admitted limit and in July by 29%. The lowest concentrations of particulate matters were recorded in December – January, when values were 43,5%, 36,7% respectively of the maximum admitted concentration.

The low concentrations recorded in January and December are due to the decrease of the excavation, transport and coal storage activity during this period.

In the other sampling point (*P2*), located near the coal deposit, the values of particulate matters concentrations recorded in 2011 are much higher.(Fig4)

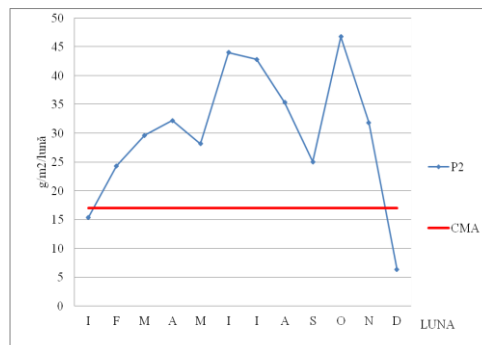


Fig.4. The variation of particulate matters concentrations in point *P2* (2011).

The highest concentration of particulate matter was recorded in October, this being 2,7 over the admitted concentration.

In this point as well, the lowest concentrations were measured from December to January, the recorded values was below the admitted limit. Of these, the lowest value was 37,4% of the maximum admitted concentration. The rest of the

period of the year, the concentrations of particulate matters had values over the admitted limit from 1,4 times to 2,6 times. This time, in sampling point *P1*, the concentrations of particulate matters recorded values lower than in 2011, without any excesses of the maximum admitted concentration. (Fig.5).

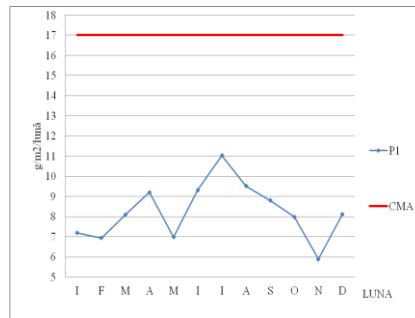


Fig.5. The variation of particulate matters concentrations in point P1 (2012).

The highest concentration of particulate matter was recorded in July, with a value of approximately 65% of the maximum admitted concentration, and the lowest concentration was recorded in November, its value being 34,6% of the admitted limit. In the sampling point of the coal deposit area (P2), excesses of the

maximum admitted concentration were recorded, their frequency being 83,3%. The time without any excesses was December – January as well, the values of concentrations being 61,3% and 80% respectively of the maximum admitted concentration. (Fig.6)

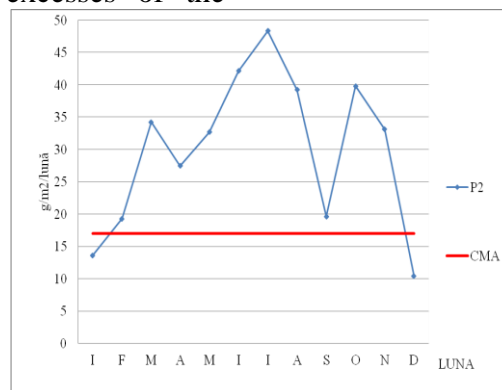


Fig.6. The variation of particulate matters concentrations in point P2 (2012).

The highest concentration of particulate matters was recorded in July, being 2,8 times over the admitted limit. Analysing the concentrations of particulate matters during the two years, even if there are significant differences between their values, we can notice that, in general, higher concentrations were recorded in June – August and lower concentrations in December – January.

CONCLUSIONS

- The three basic activities at Lupoaia quarry have a different impact on environmental factors. The excavation activity has a strong impact on the soil and phreatic waters, and transport and storage

activities have a major impact especially on air quality through the emissions of matters and noise.

- The concentrations of particulate matters in the two monitoring points have different values. Higher concentrations were recorded in the area of the coal deposit, from the point located near the actual quarry.

- In the two sampling points of particulate matters, higher concentrations were recorded in June – August corresponding to the season low in precipitations and the lowest concentrations were recorded in December – January, when the activity is also lower.

- In the sampling point located near the houses in the area, there was no excess

of maximum admitted concentrations in 2012. In the sampling point located near the coal deposit, the only time when excesses were recorded was in December – January.

REFERENCES

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2. STAS 10195/75. Air purity. Determination of particulate matters.

3. Standard 12574/87. The air in protected areas. Quality conditions.

4. MAPM Order no. 592/2002 for approving the Rules regarding the determination of maximum values, threshold values and evaluation criteria and methods of sulphur dioxide, nitrate dioxide, particulate matters (PM₁₀ and PM_{2,5}), lead, benzene, carbon monoxide and ozone in the air