STUDIES AND RESEARCH ON POLLUTION OF ENVIRONMENTAL FACTORS IN THE AREA SC ROMPLUMB BAIA MARE FROM ANTHROPOGENICAL ACTIVITY

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ABSTRACT. The main ways of soil pollution are: on path air or atmospheric path and on terrestrial path, pollution path of direct their. Sources of air pollution are two categories: natural sources (volcanic eruptions, decomposition acts, etc.) and artificial, resulting from human activities (mining and metallurgy, energy, etc.). Solid air pollutants are those treated in the paper. They are dispersed in the air from emissions of particles which containing heavy metal ions in the atmosphere having a low sedimentation rate. Finest particles, dispersed in the air gets a considerable stability, for which will persist for a much longer time in air, thereby of increasing pollution. Direct pollution comes from direct deposit of minerals on the soil as raw materials and hazardous waste, particle entrainment by deflation surface dumps, infiltration of sewage from emplacement, accidental discharge of sewage from the emplacement and crack pipes, etc. This paper shows how it is influenced soil pollution and crack pipes, etc. from the perimeter intrauzinal and extrauzinal of SC Romplumb SA by two of the factors leading to pollution, conveying technological waste water and atmospheric emissions, respectivelly.

Keywords: technological wastewater, soils, atmospheric emissions, heavy metals.

1. INTRODUCTION

In Romania, there are many areas which face with problems of environmental pollution, mono-or / and multi-industrial areas, Fistung (2002).

Two are the main pathways of pollution. One way is that atmospheric and the second is the way land, direct path of pollution. Sources of air pollution are two categories: natural sources (volcanic eruptions, decomposition acts, etc.) and artificial, resulting from human activities (mining and metallurgy, energy, etc.). Solid air pollutants are those treated in the paper. The air pollutants are dispersed in the air from emissions of particles which containing heavy metal ions in the atmosphere having a low sedimentation rate. Finest particles, dispersed in the air gets a considerable stability, for which will persist for a much longer time in air, thereby of increasing pollution. Direct pollution comes from direct deposit of minerals on the soil as raw materials and hazardous waste, particle entrainment by deflation surface dumps, infiltration of sewage from emplacement, accidental discharge of sewage from the emplacement and crack pipes, etc. The main areas

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which causing regional pollution in Romania are: petroleum exploitation, mining, metallurgical and steel industries.

An area with remarkable high pollution problems is the area of Baia Mare. It is strongly affected by the phenomenon pollution mainly due to industrial activities from the metallurgical and mining sectors also to an inadequate management of waste and sewage. Two of the main polluters of the environment are companies SC Cuprom (ceased operations in early 2009) and SC Romplumb.

2. PARTICULARITIES OF ATMOSPHERIC POLLUTION WITH HEAVY METALS IN "BAIA MARE" AREA

The area affected most significantly in terms of environmental pollution by atmospheric, from Maramures county is the area of Baia Mare. The pollution is caused by emissions of pollutants from the atmosphere mainly from S.C. Romplumb S.A. profile of non-ferrous metallurgy (primarily obtaining of decopper lead). The specific activity of non-ferrous metallurgy is emit in the atmosphere sulfur dioxide gas and dust containing lead, cadmium and other hazardous metals consistent. To this is added the pollution caused by dust containing heavy metals, driven from the ponds from the Baia Mare and the emission of pollutants into the atmosphere from fuel combustion processes of thermal power stations to produce heat and hot water and road traffic.

Tabel 1. ***Concentration of atmospheric emissions (****Rap. Bilant II -SC ENV. C-TING 2006)*

Pollutants / Emisions path	***Concentration[1] [mg/m³]***								
	Particles	*Pb*		*Cd*		*As*		*SO_2*	
		V.d.	Dp.	V.d.	Dp.	V.d.	Dp.	V.d.	Dp.
Gas cart technology [2]	-	***9,352***	***1,87***	***0,253***	***1,265***	***0,026***	-	***6853***	***13***
Exhaust granular slag basket [3]	-	***14,944***	***2,89***	***0,026***	-	***0,151***	-		
Output bin MODULE ANAG 1 [4]	-	***6,245***	***1,249***	***0,165***	-	***0,13***		***170***	-
Output bin MODULE ANAG 1 [5]	-	***4,519***	-	***0,027***	-	***0,059***	-	***149***	

[1]–Concentration is expressed as Order MAPPM nr. 462/1993;2-H = 120 m, share+43m, agglomeration+melting+hygiene agglomeration, [3]–H = 18,5 m; [4]–H = 8m; [5]–H = 8m; Vd–values determined; Dp–exceedances of the limit values on emission according to Order MAPPM nr. 462/1993

In other areas, such as the Sighetu Marmaţiei town or other towns in the county main sources of pollutant emissions are consist by units of small thermal power generation capacity, most homes use individual heating sources, fuel combustion from economic agents and population taking into account the types of fuels used (fuel oil, wood and wood waste). In these areas the development of pollutant emissions is determined by the amount of fuel consumed, there are no major sources of emissions from processes (Viable Development Strategy of Baia Mare, 2009).

From 2008 is made automatic monitoring of air quality in 5 monitoring stations. Monitoring results for the period 2008-2010 shows that the air is affected in the city center area (due to traffic) and Firiza-Ferneziu area due to factory activity Romplumb. Lead pollution is determined from the particulate fraction PM10 whereas lead is emitted into the atmosphere in the form of fine particles.

In terms of sources of air pollution in the process of obtaining decopper lead, measurements made in 2006 are defined and presented in table 1.

Quantifying quantitative of the path atmospheric pollution result from the results of measurements carried out on pipes at the bag type filters ANAG 1 and ANAG 2. From these measurements that only values from the output of lead and cadmium, on the filter ANAG 1 cause a significant air pollution, other pollutants (dust, arsenic, SO_2) fall within the limit values of Order 462/1993.

The amount of air pollutants is particularly significant. Thus, in 2007 total emissions of lead in air was 4,09t, from which 98,45% came from Romplumb, 0,7% other sources of surface and 0,87% from traffic. In 2008 total emissions of lead have dropped to 1,41 t from which 92,16 from Romplumb, 4,58% other sources of surface and 3,27% from traffic. There is a trend of reduction of emissions of lead from Romplumb and increasing the share of other sources of lead pollution (Oros et. al. 2010).

SC Romplumb SA released into the atmosphere by 120 m high stack, (tabel 1) gases from roasting of lead concentrates and the other technological operations for the obtain primary lead bullion. In Figure 1 are presented as histogram on the state of pollution emissions by the annual emissions of heavy metals into the air in Baia Mare.

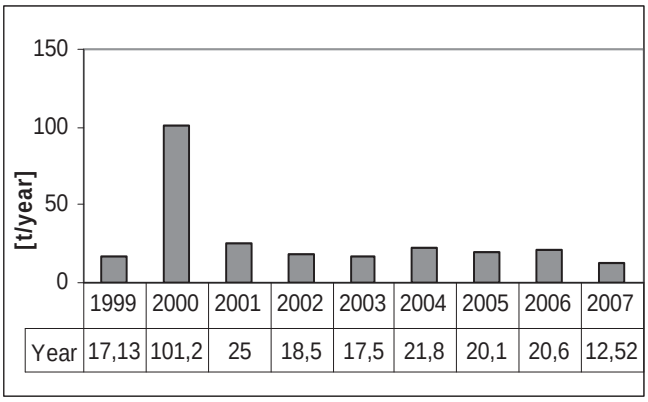

Fig.1. ***Annual average of heavy metals*** *(Viable Development Strategy of Baia Mare, 2009).*

In the period 1980-1990 air pollution with lead remained at high value.

Deviations cma (at that time cma was 0,7μg/m^3 in 24 hour average) had a frequency 75,2% in 1981 and 96% in 1989. In the period 1989–1998 there has been a reduction in pollution from 13,1μg/m^3 (annual average in 1989) at 1,87μg/m^3 (annual average in 1998). However permissible limit value 0,7μg/m^3 remained

consistently exceeded frequency of daily average being 96% in 1989 and 75-76% during 1997-1998 (Oros et. al. 2010).

When at the soil pollution contribute the sources of atmospheric pollution, potentially polluted area is established based on dispersion modeling specific air pollutants that can have an impact on the soil around the source. In the absence of data to pollutant dispersion modeling, it is recommended that radius around the source area considered to be at least 10-15 times greater than the height of dispersion pimples (Order no. 184/ 1997).

3. PARTICULARITIES OF SOIL POLLUTION WITH HEAVY METALS IN "BAIA MARE" AREA

The first way of soil pollution is through the surface waters. But the main sources of soil pollution are those with the anthrophogenic consequences, such as: temporary storage of waste, wastewater sewers, decommissioning activities and / or demolition of buildings, unloading activities, storage and handling of chemicals, lead batteries, repair and maintenance materials.

The soil is a cumulative receptor of the heavy metals pollution. A part of the metals falling from the atmosphere in the soil is fixed on the organic phase or mineral phase of the soil. Obviously, this thing leads to the accumulation of the heavy metals in the soil. Some studies that were made in this respect during 1980's suggest a soil pollution gradient with maximum concentrations that appears near the two smelting factories and a decrease of the pollution in a direct relation with the increase of the distance from the polluting source, following the direction of the wind to a distance up to 25 km (Oros et. al. 2010).

The majority of the polluting metals (some 70%) fall on a 7 km distance. Measuring in depth, the majority of the polluting agents can be found in superficial level, between 0 and 10 cm. They reported the following statement of the soil pollution with heavy metals (Oros et. al. 2010).

Variation limits of heavy metals were analyzed by comparison to values for less sensitive soils, according to Order no 756/1997, about environmental pollution assessment. Soil sampling was done in accordance with reference documents Order no. 462/1993, STAS no. 7184/1–84, Order no.184/ 1997.

Specific analysis on the determination of chemical elements were made by mineralization with royal water and then by atomic emission spectrometry in inductively coupled plasma (ICP–AES) were performed in specialized laboratories of Research Institute for Analytical Instrumentation-ICIA Cluj–Napoca and of the National Institute Research-Development for Soil, Agrochemistry and Environmental Protection–ICPA Bucureşti.

Cadmium (fig. 2) shows high values for all soil samples taken, as its concentrations both exceed the limits of alert threshold (5 mg/kg) and intervention threshold (10 mg/kg) at all sampling depths. Cd concentrations are between 11.6 – 67.4 mg/kg s.u.

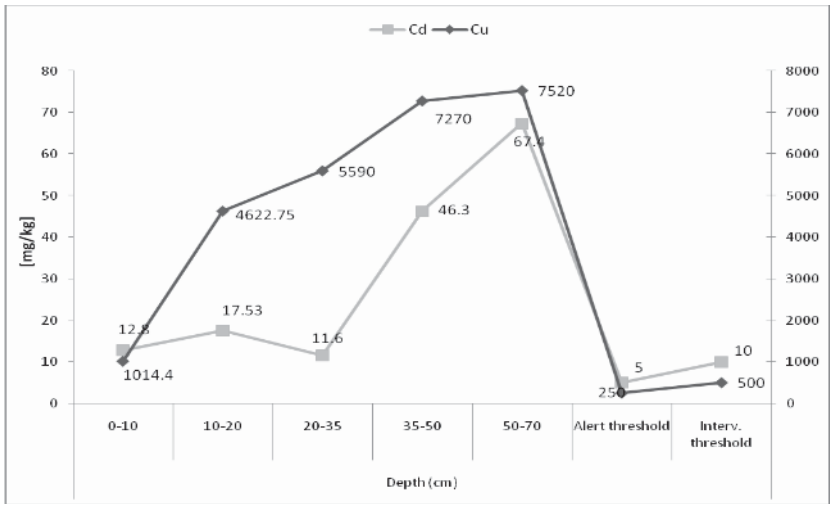

Fig. 2. ***Concentrations of cadmium and copper depending on depth***

Copper. Determined concentrations in soil samples taken shows high levels of Cu with values exceedance of alert threshold (250 mg/kg) and the intervention threshold (500 mg/kg) for all depths of sampling. The determined values are increasing proportionally with depth (fig. 2).

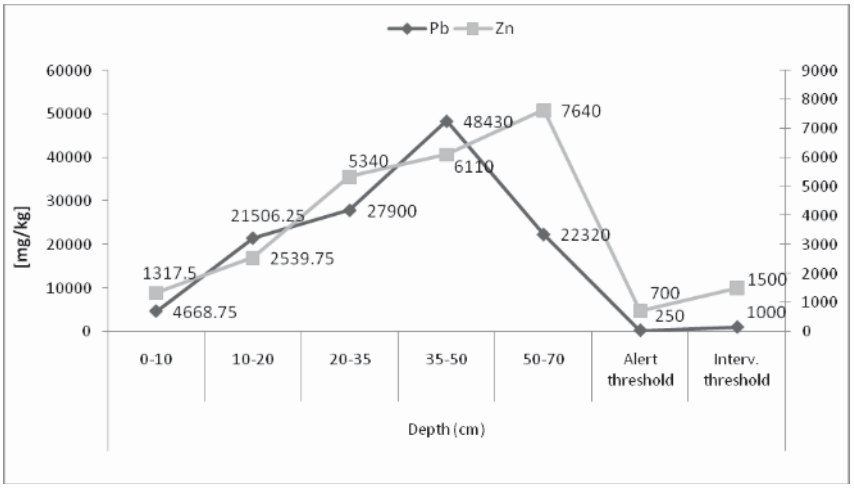

Fig.3. ***Concentrations of lead and zinc depending on depth***

Lead (fig. 3) is distributed to all depths of sampling as main pollutant. In all investigated soil, concentration of lead exceeds the critical values for alert threshold and intervention threshold. By analyzing the graph, it can be concluded that the determined values are increasing proportionally with depth except the sample taken from the depth 50-70 cm, which shows a slight decrease.

Zinc. High concentration of Zn (fig. 3) from soil samples, forming small solid particles, is due to metallurgical industry. Concentrations of zinc have high values at all sampling depths, exceeding the alert threshold (700 mg/kg), and intervention alert (1500 mg/kg), except sample from up to 10 cm depth where it falls below the intervention threshold.

4. CONCLUSIONS

Air pollution by heavy metals is practically circulation of very fine particles of such materials. Pollution sources are stationary in particular (eg. metallurgical economic units) and also mobile (eg. road transport).

The particularity of this pollution type lies in the that fact she "acts" of soil attributes on almost continuously, by their standing in the atmosphere at different heights, amount of time (even when the emission sources ceases the activity). At the same time are spread over large distances from their source.

They then get both on the ground as well as in soil at different depths, especially being circulated by water.

Heavy particles get the pathways to greater depths than in the case of direct pollution of the soil.

Pollution is made by physical human intervention, defining anthropic phenomena. Polluting materials are relatively stable, can be easily monitored as a manifestation in the pollution.

In these conditions and remediation methods are more efficient, more diverse, more stable and within the reach of researchers.

Direct pollution of the soil is more easily quantifiable in terms of concentration, namely the identification of all heavy metal pollutants.

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