DETERMINATION OF HEAVY METALS IN THE "ExtraColors" PAINT FACTORY

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ABSTRACT

Earth is one of the major reservoirs of various pollutants, while on the other hand it is one of the most important constituent parts of the environment, so it is an unrepeatable natural resource and performs some important functions for life, over 90 % of agricultural products are taken from the land. Meaning of polluted soil shows that soil is accumulated polluting matter, which adversely affects the environment. Environmental pollution and, in particular, the heavy metal surface area is present in many industrial and mining areas all over the world, including our country. As a result of rising population, the need for vital consumption has increased considerably, as well as industrial production. As a polluting industry, it can be considered the color-producing industry as well. Such an industry is located in the town of Vushtrri, the "ExtraColors" color plant, which is considered a factor affecting soil contamination (the environment in general). The purpose of this study is to assess the state of the environment and the soil in the color plant "ExtraColors" factory and its near surrounding, nearby village trying to estimate the impact that the plant's products have had on environmental pollution (soil, grass and vegetation, as well as in the water resources of the area) as a result of the release of heavy metals from the raw materials used by this plant.

Keywords: Earth, contamination, heavy metals, analysis, industry, colors.

PRESENTATION

Polluting soil ecosystems from toxic metals is a global problem. These phenomena have greatly influenced the start of discussions about these issues and have also stimulated new research and research in this area. The environmental quality of the soil has a direct impact on the quantity of plant and animal products that it has, and also has a significant impact on the quality of water in it [1].

Monitoring means repeated measurements performed on time and in certain areas, by appropriately selecting the stations, the duration and the frequency of the measurements. Before launching a monitoring program, it sets out the purpose for which it will be carried out, because depending on the purpose of the monitoring, it determines what will be monitored when, where and how it will be monitored. In the design of a monitoring program it is very important to set the monitoring objectives first. As the analytical parameters to be measured, the number and placement of the measurement stations and the frequency and duration of the measurements [2,3]. Monitoring of the restricted areas where industrial or other polluting activities have been developed as lands at the border with them. In these cases, the fullest knowledge of the polluting activity (knowing the nature and quantity of pollution and the way of depositing them) is of particular importance. Prior to this, the most potentially polluted sites should be identified through the study of existing information or by "quick" investigations of the area where these so called "hot spots" should be monitored and studied separately from the

monitoring of the area as a whole. Particular importance in the design of the land sampling program is the purpose for which monitoring will take place [4-6].
Environmental monitoring of an area that has suffered from lead contamination can be accomplished for either of these two purposes:

- Determine the part of the surface where the pollution is maximum (or above allowed).
- Assess the level of lead content throughout the territory [7].

For the purpose of the study, the assessment of environmental impacts of heavy metal waste in the "ExtraColors" paint factory in Vushtrri have selected and analyzed representative groups of samples of the environmental components (surface and profile) which then cause damage to water and vegetation.
We have divided the experimental work into three phases:

- Control and evaluation of raw materials of the "ExtraColors" factory in Vushtrri.
- Assessment of the land inside the factory and adjacent to it.
- Evaluating land far from the factory.

The color expression is traditionally used for the description of pigmented materials as opposed to the transparent film that is applied to any dye or dye is a complex multi-component mixture consisting of the following components: (binders, pigments, fillers, adhesives and solvents). Each of the components mentioned above has its own role in the final product and determines the final quality for the application of the lyricist.

METHODOLOGY

Soil sampling is done prior to the casting of anticorrosion color, a surface (20 x 20) cm is defined, the vegetation layer is removed and samples taken in depth (10 – 15) cm, then we poured the anti-corrosion color into soil (earth), after two days we analyzed the earth with the dissolved color at 12 cm, we have taken the initiative to put the anti-corrosion dye on the ground and let it stay in and for two full weeks, and then analyze the impact of this color as a product (made of inorganic and organic) of the Color Factory "ExtraColors "In environmental pollution.

A total of 12 soil samples were analyzed, which are mainly surface (M1, M2, M3, M4 and G1, G2, G3, G4) and samples taken up to 50 cm (G1 +, G2 +, G3 +, G4 + which had different locations at the entrance of the "ExtraColors" factory in Vushtrri at its exit, 100 m from this factory and in the village of Dalak (2.5 km from the factory).

Table 1: Sampling venue

Sample	Set point	The designated place
M1	At the beginning of the factory “ExtraColors”	At the entrance to the factory “ExtraColors”
M2	Some m away from the factory “ExtraColors”	At the exit from the factory “ExtraColors”
M3	100 m away from of the factory “ExtraColors”	The road to the village of Studime
M4	2 km away from of the factory “ExtraColors”	Dalak village
G1	At the beginning of the factory “ExtraColors”	At the entrance to the factory “ExtraColors”
G2	Some m away from the factory “ExtraColors”	At the exit from the factory “ExtraColors”
G3	100 m away from of the factory “ExtraColors”	The road to the village of Studime
G4	2 km away from of the factory “ExtraColors”	Dalak village
G1+	At the beginning of the factory “ExtraColors”	At the entrance to the factory “ExtraColors”
G2+	Some m away from the factory “ExtraColors”	At the exit from the factory “ExtraColors”
G3+	100 m away from of the factory “ExtraColors”	The road to the village of Studime
G4+	2 km away from of the factory “ExtraColors”	Dalak village

Preparation of samples : Samples are cleaned (from stones, peelings) left to dry for 2-3 days at environment temperature where they are divided into four almost equal parts, selected two in

front of each other and treated as a single (tampering method).The selected sample is pressed and grinded with porous mortar, sift up to a particle size of 2-3 mm particle size because the treatment will be the best, with more than 90 % of pollutants expected to appear in larger sized particles small. Initially soil samples were dried at 102 ^{O}C for 2 to 3 hours before analytical treatment.

Work performance - each sample so stuffed until homogenisation is measured on the 1 g analytical scale by placing it in the glass panes by adding 10 ml of "royal water" (a hydrochloric acid unit and three nitric acid units), and placed on the reshot with a temperature above 100 ^{O}C where they stay about 10 min.

The gels above the electric planks on the occasion of the addition of "royal water" take the orange color and in the case of boiling them, after evaporation that color is lost and then return to the previous state and proceed by adding hydrochloric acid HCl (1: 1) they stay at that temperature for about 15 minutes until the half drying becomes, a process that needs special care not to overcome the desired state. Now the samples after their two evaporations are turned into balloons 200 ml by filtration, then the distilled water is washed until there are traces of the sample in the dishes where they have remained during their evaporation, also distilled to 100 ml by mixing them. Finally, we bring the samples to the absorber, to which we have placed the lamp of the relevant element for which we will make the determination (in our lead case), where the reading of the result is done.

The introduction of instrumental parameters for the analysis of Pb, Zn, Ni, Fe, Co, Cd, Bi, Cu in environmental samples is based on the analytical methods of atomic absorption spectrometry.

Table 2: Results obtained in soil samples before pouring of corrosion color

Elements	M1	M2	M3	M4
Pb (mg/kg)	746.53	104.64	365.72	191.50
Zn (mg/kg)	100.02	510.42	684.31	549.29
Cd (mg/kg)	<0.01	<0.01	<0.01	<0.01
Co (mg/kg)	18.11	42.12	31.25	43.44
Ni (mg/kg)	23.22	32.78	32.11	45.20
Mn (mg/kg)	375.24	308.88	286.40	258.70
Bi (mg/kg)	<0.01	<0.01	<0.01	<0.01
Cu (mg/kg)	14.01	12.11	32.15	11.02

Table 3: Results obtained in soil samples after two days of spilling of the anti-corrosion color.

Elements		G1	G2	G3	G4
Pb (mg/kg)		876.70	191.42	676.82	269.74
Zn (mg/kg)		418.54	122.01	140.02	289.76
Cd (mg/kg)		<0.01	<0.01	<0.01	<0.01
Co (mg/kg)		480.02	460.01	570.91	430.72
Ni (mg/kg)		24.71	33.02	36.09	46.05
Mn (mg/kg)		452.60	275.68	246.72	156.91
Bi (mg/kg)		<0.01	<0.01	<0.01	<0.01
Cu (mg/kg)		37.01	19.25	28.06	12.08

Table 4: Results obtained in soil samples after two weeks of anti-corrosive color.

Elements		G1+	G2+	G3+	G4+
Pb (mg/kg)		998.56	210.62	709.74	411.11
Zn (mg/kg)		725.52	179.54	409.09	298.88
Cd (mg/kg)		<0.01	<0.01	<0.01	<0.01
Co (mg/kg)		810.03	952.04	584.09	501.18
Ni (mg/kg)		162.74	11.91	189.97	344.42
Mn (mg/kg)		216.20	212.30	237.44	151.71
Bi (mg/kg)		<0.01	<0.01	<0.01	<0.01
Cu (mg/kg)		<0.01	<0.01	<0.01	<0.01

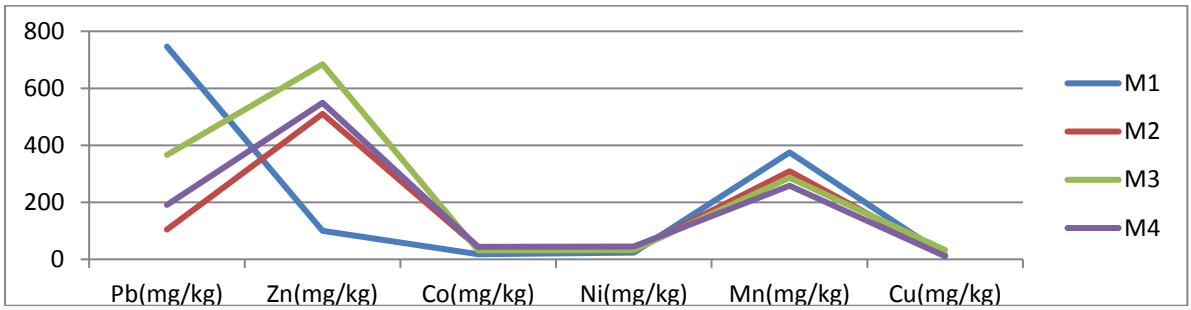

Figure 1: The amount of metal stock varies for the first 4 samples.

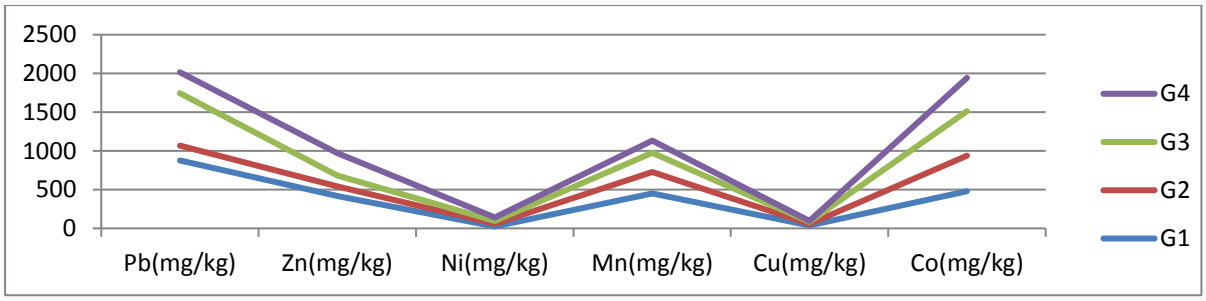

Figure 2: Depending on the quantity of heavy metals for the second 4 samples.

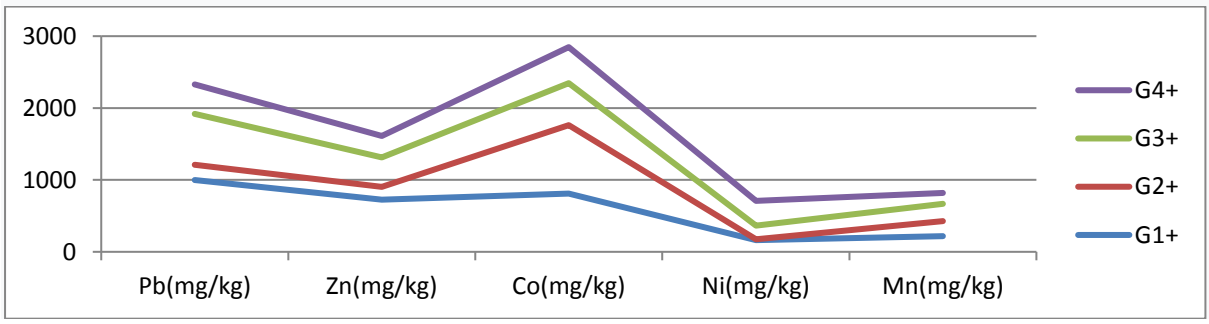

Figure 3: Depending on the quantity of heavy metals for the 4 third samples.

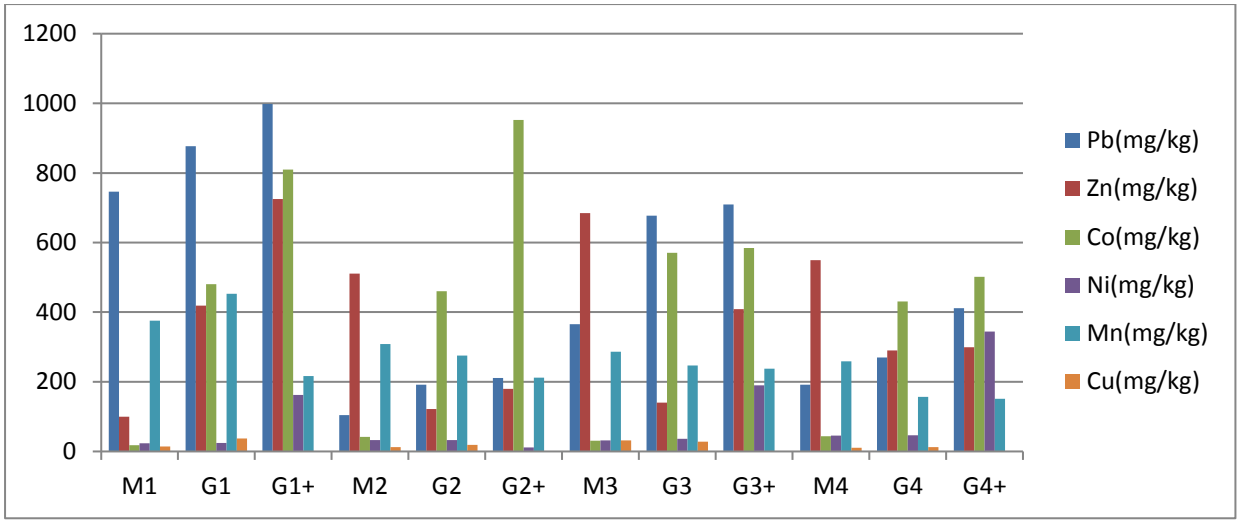

Figure 4: Depending on the quantity of heavy metals for the analyzed samples.

Figure 4 shows the dependence on the amount of heavy metals for the samples taken, where the samples M1, M2, M3 and M4 are samples analyzed before pouring the anti-corrosion color. While samples G1, G2, G3, G4 and G1 +, G2 +, G3 +, G4 + are soil samples analyzed after the anticorrosion color of her residence on the ground for two days, respectively for two weeks.

RESULTS AND DISCUSSIONS

In the first M1 sample at the entrance of the plant (in the liquid product ward), prior to the corrosion dyeing, Pb (0.0746 %), Zn (0.0100 %), Fe (3.078 %) and Mn (0.0375 %), while after the anti-corrosion dyeing and allowing two days stay, the G1 specimen has been shown Pb (0.0876 %), Zn (0.0418 %), Co (0.0480 %), Ni (0.0247 %), Fe (3.945 %), Mn (0.0452 %), but at the same location after 2 weeks, at a depth of 50 cm in the G1 + sample has shown Pb (0.0998 %), Zn (0.0725 %), Co (0.0810 %), Fe (3.927 %).

In the second M2 sample at the factory outlet before the corrosion color is poured, Pb (0.0104 %), Zn (0.0510 %), Fe (3.283 %), Mn (0.0308 %), while after the anti-corrosion and residence permit two days, the G2 specimen has been shown Pb (0.0191 %), Zn (0.0122 %), Co (0.0460 %), Ni (0.0330 %), Fe (4.322 %), Mn (0.0275 %), but at the same location after 2 weeks, 50 cm deep in the G2 + sample has shown Pb (0.210 %), Zn (0.0179 %), Co (0.0952 %), Fe (3.729 %), Mn (0.212 %).

In the third M3 specimen 100 m away from the factory (the road to the village of Studime), before the corrosion color is poured, Pb (0.0365 %), Zn (0.0684 %), Fe (3.180 %), Mn (0.0286 %), while after the anti-corrosion and residence permit two days, the G3 specimen has been shown Pb (0.0676 %), Zn (0.0140 %), Co (0.0570 %), Ni (0.0360 %), Fe (3.687 %), Mn (0.0246 %), but at the same location after 2 weeks at 50 cm depth in the G3 + sample has shown Pb (0.0676 %), Zn (0.0409 %), Co (0.0584 %), Ni (0.0189 %), Fe (3.160 %), Mn (0.0237 %).
In the fourth M4 sample in the village of Dalak 2,5 km away from the factory, before the corrosion color is poured, Pb (0.0191 %), Zn (0.0549 %), Fe (5.134 %), Mn (0.0258 %), while after the anti-corrosion and residence permit two days, the G4 specimen has been shown Pb (0.0269 %), Zn (0.0289 %), C0 (0.0430 %), Ni (0.0460 %), Fe (3.684 %), Mn (0.0156 %), at the same location after 2 weeks, in the 50 cm depth the G4 + show has been shown Pb (0.0411 %), Zn (0.0298 %), Co (0.0430 %), Ni (0.0344 %), Fe (3.637 %), Mn (0.0151 %).

When it comes to other analyzed elements such as. Cu, Bi, Cd in the samples taken can be considered trace elements as they are shown in very small quantities.

CONCLUSION AND RECOMMENDATION

From the analysis of environmental representative samples on the ground, the presence of lead (Pb), zinc (Zn), iron (Fe) etc. was found for the purpose of this study. The source of this pollution is precisely the production of alkali based (organic) materials produced by the years and at the same time by the accidental pouring of these color categories into the earth and the deportation of these colors to different depths of the soil. We think that studies should be undertaken and the world literature on land cleaning and rehabilitation of heavy metals pollution in this area, an area that is habitable and where residents use farmed and livestock products grown and cultivated in these areas, should be exploited.

Mostly 12 sampling points focused on the surface layer of the earth where the first four and second samples were taken up to 20 cm and the third samples were taken in depth 50 cm, because pollutants or metals that are caused by the production of alkyd-based dyes and their accidental spillage can deploy deeply inside the soil.

Based on the results obtained during the soil analysis I recommend:

- Conduct continuous monitoring of the level of soil contamination.
- To replace the alkyd based corrosion dyes in water-based paints (this method is being applied by the "ExtraColors" factory in Vushtrri).
- Planting trees (oaks) close to the polluted area to the distance where there is no contamination, then using the land for planting foodstuffs.
- Based on the results obtained in cases close to the factory, it is recommended that the land treatment (soil change) be used and then used for agricultural purposes

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