XI INTERNATIONAL CONFERENCE
INDUSTRIAL ENGINEERING AND ENVIRONMENTAL PROTECTION 2021
IIZS 2021, October 07-08, 2021, Zrenjanin, Serbia

EFFECTS OF ENVIRONMENTAL POLLUTION DUE TO LAND TRANSPORT ACTIVITY

LUISA IZABEL DUNGAN[1], ADRIAN CIOABLĂ[1*], MIRCEA ADRIAN DUNGAN[2], MARIANA NELA STEFANUT[3], FRANCISC POPESCU[1]

[1] University Politehnica of Timisoara, Mechanical Engineering Faculty, Mihai Viteazu Blv., No. 1, 300222, Timisoara
[2] SNTFC CFR CALATORI SA
[3] National Institute of Research and Development for Electrochemistry and Condensed Matter, Dr. A. P. Podeanu 144, 300569, Timişoara

adrian.cioabla@upt.ro

INTRODUCTION

Transport presents real challenges as society tries to ensure the increasing of people standard life level and more environmentally safely future.

The transport networks are one of the keys of progress. The impact of transportation on environment consists in soil erosion, soil contamination and frequently in contamination both of air and water and soil. The using of toxic materials in transport industry can determine contamination of soil and some variations of natural vegetation. Unintentionally leaks of fuel and oil from motor vehicles are often washed on roadsides and penetrate into the soil. There are many chemicals used for maintained of railroad which represented a certified way to soil contamination. Usually, near railroads, ports and airports, large concentrations of hazardous materials and heavy metals can be found.

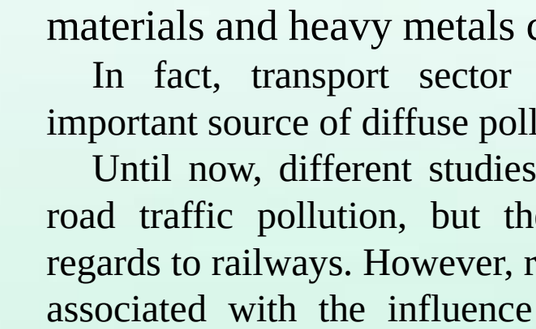
In fact, transport sector can be considered as an important source of diffuse pollution to the environment.

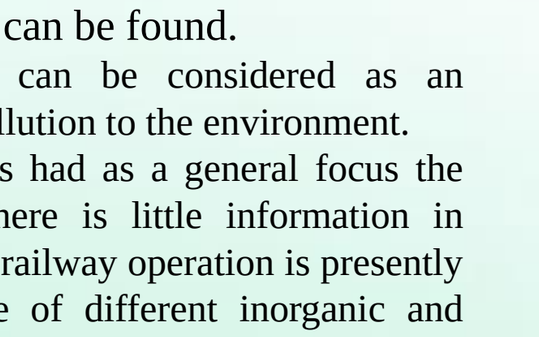
Until now, different studies had as a general focus the road traffic pollution, but there is little information in regards to railways. However, railway operation is presently associated with the influence of different inorganic and organic substances with a high level of impact on the environment.

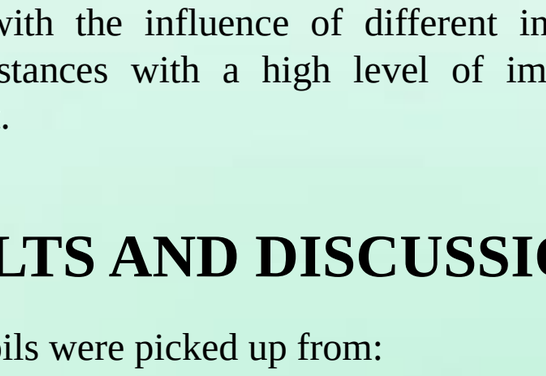
RESULTS AND DISCUSSION

Samples of soils were picked up from:
- railway station Timisoara Sud,
- Commercial stop Semenic,
- along Primaverii street in Chișoda
- 3(three) junction sections in Chisoda and Giroc.

These samples were collected between 09-12 October 2017.







Samples were taken out from the surface of places. Soils were milled, dried and weighted.

Table 1 - Concentration of heavy metals in soils (part 1)

Sample	Parameter			
	Cr±SD (µg/g)	**Fe**±SD (µg/g)	**Pb**±SD (µg/g)	**Mn**±SD (µg/g)
Soil 1	13.1±3.9	7216.9±0.8	14.4±3.3	181.8±1.2
Soil 2	9.4±1.6	9584.2±1.2	20.1±1.6	210.7±1.1
Soil 3	48.6±0.1	16401.0±0.8	27.8±0.6	234.8±1.9
Soil 4	21.7±4.3	11469.4±1.1	12.4±1.2	136.7±1.6
Soil 5	30.2±7.3	15438.6±6.8	40.8±1.2	219.9±1.9
Soil 6	16.7±7.1	12097.4±0.2	19.8±0.3	253.3±5.0

Table 2 - Concentration of heavy metals in soils (part 2)

Sample	Parameter (µg/g)			
	Ni±SD (µg/g)	**Co**±SD (µg/g)	**Cd**±SD (µg/g)	**Zn**±SD (µg/g)
Soil 1	2.1±0.1	2.04±0.3	abs.	180.81±2.5
Soil 2	9.4±0.2	2.84±0.2	abs.	117.20±5.0
Soil 3	49.1±0.3	4.17±0.0	0.1±0.0	281.64±3.2
Soil 4	28.1±0.3	2.63±0.2	abs.	427.69±7.1
Soil 5	33.3±0.4	3.18±0.2	0.03±0.0	241.05±3.4
Soil 6	1.5±0.0	2.71±0.1	abs.	110.21±1.1

The concentration of heavy metals in soils was expressed as µg/g dry weight soil (ppm), so the dying process is very important. Soils were dried and the humidity was determinate using gravimetric method (105°C). In order to uniformize and to compare the results, after chemical digestion, the samples were transferred into 25 mL marked bottles and completed with ultrapure water (laboratory Barnstead EASYpureRoDi apparatus) to 25 mL. For AAS analyses, 1 mL of analyte (each solution) was diluted for 20 times with 05% HNO3 (ISO 15586 2003(E)).

All samples were injected in triplicate. The values indicated by the apparatus were multiplied by dilution grade (20) and were reported at 1 g dried material.

CONCLUSIONS

Registered results showed the presence of Cr, Fe, Pb, Mn, Ni, Co, Cd and Zn in different soils, around Timisoara. Hydrargyrum was not found in the samples. Cadmium was found in soil 3 and soil 5 (0.1; 0.03 µg/g) and total Cr concentration varied between 9-49 µg/g. Large quantities of Zn (110-427µg/g) and Mn (130-250µg/g) were found in all soils. The concentration of Pb varied be-tween 12.4-40.8 µg/g and the concentration of Ni varied between 1.5-49 µg/g. The soil 5 from rail-way station Timisoara Sud has the higher Pb concentration.