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Ambient Air Quality

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Abstract

This paper presents the air quality from automatic and manual monitoring in Prahova area.

Key word: *pollution, ambiental air, limit value.*

General Presentation

State of the atmosphere is highlighted by presenting the following issues: pollution impact of different pollutants, the quality of rainfall, atmospheric ozone, the dynamics of emissions of greenhouse gases and some manifestations of climate change. Sources of environmental pollution are divided into two broad categories: sources of contamination by solid particles• sources of contamination by gases and vapors. These can be natural sources and artificial sources. Artificial sources are, in particular, industrial enterprises, power stations and heat transport, residential heating plants, waste incinerators, etc.. In the year 2008 air quality in Ploiesti was monitored by hourly or daily measurements in 14 stations (6 automatic stations and 8 manual stations).

Pollutants SO_2, NO_2/NO_x, CO, benzene, particulate matter, lead and ozone are monitored and evaluated in accordance with the Order of the Ministry of Waters and Environmental Protection no. 592/2002, which implements the requirements of European regulations, cadmium is related to the requirements of the Order of the Ministry of Environment and Water Management no. 448/2007 and ammonia, formaldehyde, hydrogen sulfide at the site of STAS no. 12574/87 - Air of protected areas. In Ploiesti air quality is monitored by means of 6 automatic stations and 8 manual stations.

Stations are: PH-1 stations (EPA Headquarters) and pH 5 (Bucharest Avenue) are stations that monitor the traffic impact on the environment. Pollutants monitored are the specific transport activity, namely SO_2, NO, NO_2, NO_x, CO, metals (in PM_{10}) PM_{10}, benzene, toluene, o-xylene, ethylbenzene, m, p - xylene.

PH-4 stations (City Hall Brazi) and PH - 6 (M. Bravu) stations are showing the influence of industrial emissions on the level of pollution. Monitored pollutants are SO_2, NO, NO_2, NO_x, CO, O_3, PM_{10}, benzene, toluene, o-xylene, ethylbenzene, m, p - xylene (pH 4) and SO2, NO, NO2, NOx, CO, O3 metals (in PM10) PM10 (PH 6).

PH-2 station (Victoria PTA) urban background station was located in residential area, away from local emission sources. Monitored pollutants: SO_2, NO, NO_2, NO_x, CO, O_3, PM_{10}, metals (in PM_{10}), benzene, toluene, o-xylene, ethylbenzene, m, p - xylene.

PH-Station 3 (CityHall Blejoi) suburban background station, evaluates the influence "urmane settlements" on air quality. Monitored pollutants: SO_2, NO, NO_2, NO_x, CO, O_3, PM_{10}, metals (in PM_{10}), benzene, toluene, o-xylene, ethylbenzene, m, p - xylene. The type of automatic stations are present in table no 1

Table 1. Automatic stations

City	Code Station	Type Station	Pollutant	Type determination	Observations Validated data capture %
Ploieşti	EPA headquarters	Traffic	NO_2	Automatic	49,1
			SO_2	Automatic	42,4
			CO	Automatic	54,5
			PM_{10}	Automatic	42,9
			C_6H_6	Automatic	37,5
	PH2- Pta Victoriei	Urban	NO_2	Automatic	29,1
			SO_2	Automatic	17,6
			CO	Automatic	59,8
			O_3	Automatic	46,6
			PM_{10}	Automatic	40,9
			C_6H_6	Automatic	33,5
Blejoi	PH3- City hall	Suburban	NO_2	Automatic	58,7
			SO_2	Automatic	32,9
			CO	Automatic	55,4
			O_3	Automatic	50,4
			PM_{10}	Automatic	27,8
			C_6H_6	Automatic	17,6
Brazi	PH 4 City hall	Industry	NO_2	Automatic	46,5
			SO_2	Automatic	49,5
			CO	Automatic	48,7
			O_3	Automatic	32,2
			PM_{10}	Automatic	48,4
			C_6H_6	Automatic	-
Ploieşti	PH5 Bucuresti Blvd	Traffic	NO_2	Automatic	53
			SO_2	Automatic	35,7
			CO	Automatic	58,4
			PM_{10}	Automatic	39,1
			C_6H_6	Automatic	39,1
	PH6 M Bravu	Industrial	NO_2	Automatic	47,6
			SO_2	Automatic	53,3
			CO	Automatic	56,9
			O_3	Automatic	43,3
			PM_{10}	Automatic	47,5

The eight manual stations located as follows: In eastern Ploiesti are two stations: Obstetrics and Gynecology and POLISERV that monitor activity units located in this area (the beneficiary decided, DBW, VEGA-area refinery NE). Thus, collected and analyzed following indicators: NO_2, H_2S, HCHO, NH_3, particulate matter. The area is located north of Ploiesti station: ICERP that monitors activity of the derogation LEVER, BIANCA INTERNATIONAL refrigerators and traffic Ploiesti (DN1). Thus, collected and analyzed following indicators: NH_3, NO_2, SO_2, particulate matter. The area is located in Ploiesti West Station EPA Ploiesti headquarters units

to monitor activity AGROREB, ELECTROMETALICA and traffic is collected and analyzed following indicators: H_2S, HCHO, NH_3, particulate matter. In the Southern area of Ploiesti, Corlatesti stations are located, Unit 2 Fire, which monitors the activity of the Trees: TIMKEN, UPETROM, Shed CFR washing station wagons, mill PETROBRAZI. Take and analyze the following indicators: NH_3, H_2S, HCHO, particulate matter City Center station is monitored by the Palace of Culture, the point chosen to follow industry owe pollutant dispersion and in particular the four petroleum refining processing surrounding the city. Indicators are taken and analyzed: NH_3, H_2S, HCHO, particulate matter. Sedimentary particulate monitors in the city of Ploiesti 5 points located as follows: EPA office, refinery Corlatesti, Brazi, Obstetrics and Gynecology and Weather Station. The type of manual stations are present in table no 2.

Table 2. Manual stations

Station	Type station	Type pollutant (SO2, NOx, tsp, PM10, Pb, Cd, etc.)	MU	Max	Number exceeded	Number analysis	Frequency analysis exceeded %
EPA Headquarters	Traffic	HCHO	mg/mc	0,0139	5	261	1,916
		NH_3	mg/mc	0,1528	20	261	7,663
		NO_2	mg/mc	0,1649	58	261	22,22
		SO_2	mg/mc	0,122	-	261	
		H_2S	mg/mc	0,0074	-	261	
		Particulate matter	mg/mc	0,162	45	261	17,24
ICERP	Traffic	NH_3	mg/mc	0,1377	16	256	6,25
		NO_2	mg/mc	0,153	1	256	0,39
		SO_2	mg/mc	0.096	-	256	
		Particulate matter	mg/mc	0,162	58	256	22,66
Obstetrics and Gynecology Hospital	Industry	HCHO	mg/mc	0,0188	28	242	11,57
		NH_3	mg/mc	0,123	1	242	0,41
		H2S	mg/mc	0,0133	6	242	2,48
		Particulate matter	mg/mc	0,164	26	242	10,74
Unit 2 Fire	Industry	NH_3	mg/mc	0,146	9	245	3,67
		SO_2	mg/mc	0,079	-	245	
		H_2S	mg/mc	0,0106	1	245	0,41
		Particulate matter	mg/mc	0,16	10	245	4,08
Palace of Culture	Urban	HCHO	mg/mc	0,0171	14	238	5,88
		NH_3	mg/mc	0,113	2	238	0,84
		H_2S	mg/mc	0,0103	2	238	0,84
		Particulate matter	mg/mc	0,166	51	238	21,43
Brazi	Industry	HCHO	mg/mc	0,017	6	204	2,94
		NH_3	mg/mc	0,131	6	204	2,94
		H_2S	mg/mc	0,0096	1	204	0,49
		Particulate matter	mg/mc	0,163	15	204	7,35
Poliserv	Industry	HCHO	mg/mc	0,0175	8	250	3,2
		NH_3	mg/mc	0,113	4	250	1,6
		NO_2	mg/mc	0,112	1	250	0,4
		H_2S	mg/mc	0,0119	3	250	1,2
Refinery Corlăteşti	Industry	HCHO	mg/mc	0,0153	4	113	3,54
		NH_3	mg/mc	0,1497	3	113	2,65
		H_2S	mg/mc	0,0103	2	113	1,77

The measured values are values of immission of pollutants, which contribute to economic activity in the area where appliances are located. Temperature, humidity, pressure, air movement and rainfall causes substantial changes in the level of pollution of the atmosphere. Low economic activity, road traffic is also an important determinant of pollution levels.

Nitrogen Dioxide

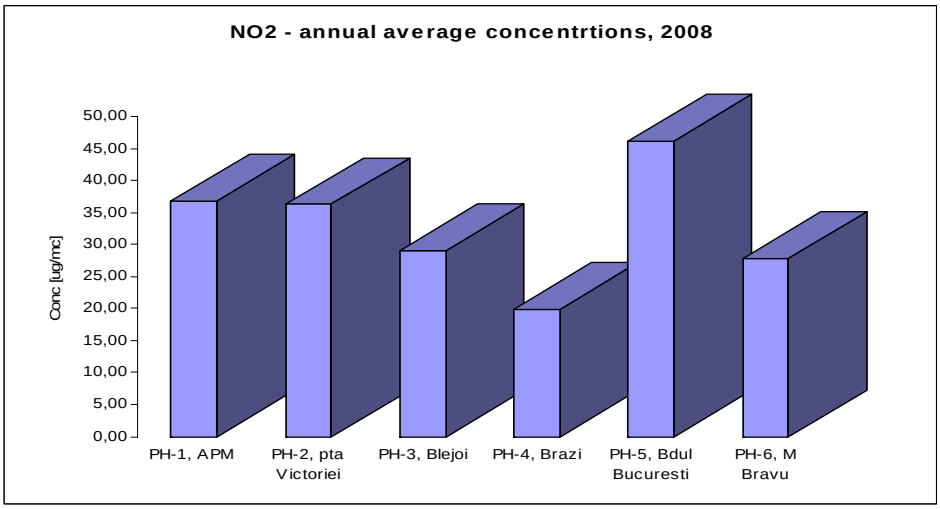

Fig.1. Changes in annual average concentrations, NO_2 - 2008

Sulfur Dioxide

Sulfur dioxide concentration has not exceeded the thresholds of quality monitoring stations to protect human health and ecosystem protection under MAPM Order no. 592/2002. Were exceedances of the hourly 350 g/m^3 or daily 125 μg/ m^3limit value the number of exceedances allowed in one year (24 and 3 respectively).

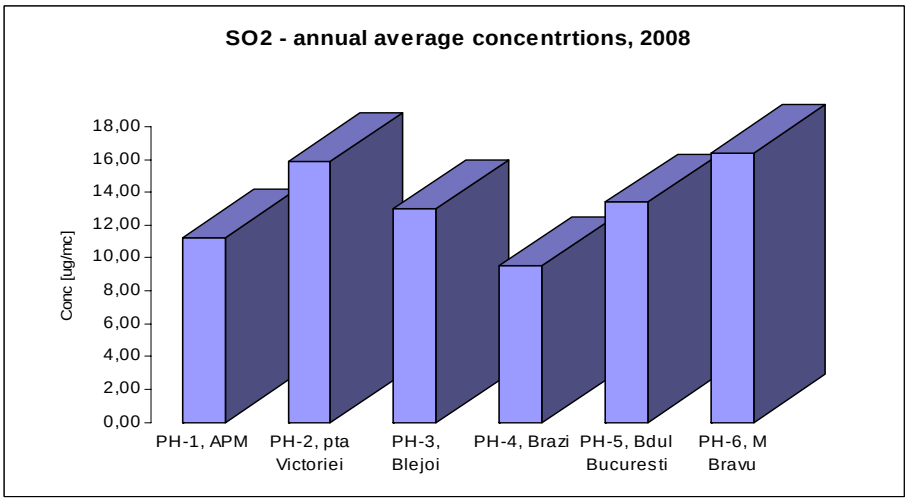

Fig. 2. Changes in annual average concentration, SO_2 - 2008

Particulate Matter

Sources of atmospheric particulate pollution can be natural, such as particle entrainment from the surface by wind, or man: production processes (metallurgy, chemical industry etc.), combustion in the energy sector, construction sites and road , dumps and landfills, industrial and municipal, individual heating systems, especially those using solid fuels, etc.. Nature of these powders is very diverse. Thus, they may contain carbon particles (soot), heavy metals (lead, cadmium, chromium, manganese, etc..) Iron oxides, sulfates, but other toxic

pollutants, some of them with carcinogenic effects (such as organic pollutants persistent PAHs and PCBs adsorbed on the surface of solid aerosol particles). Annual average concentrations of particulates below 10 microns (PM_{10}) exceeding the limit (40 mg / cm) in stations and PH2 PH6.

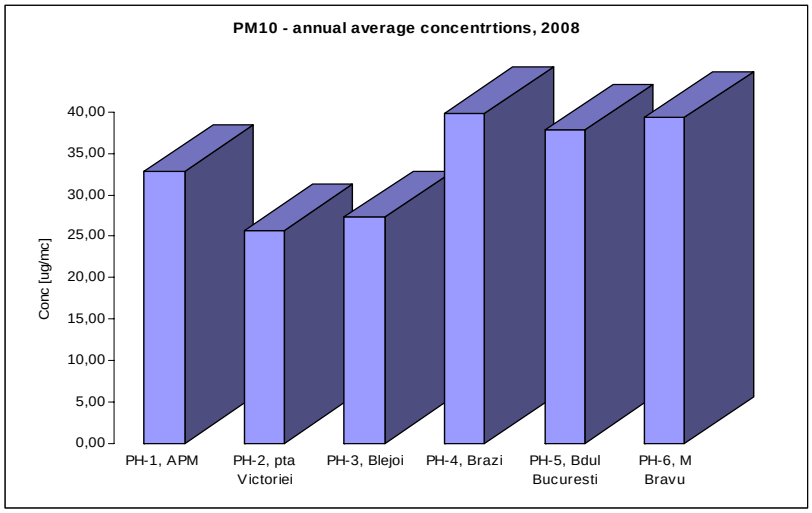

Fig. 3. Changes in annual average concentration, PM_{10} - 2008

Heavy Metals

Laboratory Monitoring Service, Synthesis and Coordination of the Environmental Protection Agency determined Prahova: a concentration of heavy metals in dust vacuumed (Pb, Cd, Zn, Ni) 4 manual monitoring stations a concentration of heavy metals in particulate depositing an effort to change indicators: lead, cadmium, zinc, copper, nickel 5 stations in Ploiesti (EPA headquarters, Brazi, Raf Corlatesti, Weather Station and Hospital of Obstetrics and Gynecology. a concentration of heavy metals in PM_{10} (Pb, Cd, Ni) 5 automatic stations monitoring ambient air quality. Heavy metals - copper, chromium, mercury, cadmium, nickel, zinc, lead - are compounds that can not be degraded naturally, with long time persistent in the environment and long term are dangerous because they can accumulate in the food chain. Heavy metals may come from stationary and mobile sources: fuel combustion processes and waste processes of non-ferrous metallurgy and heavy traffic. Heavy metals can cause damage to muscle, nerve, digestive, general state of apathy, may affect the development of the plant, impeding the normal course of photosynthesis, respiration and sweat.

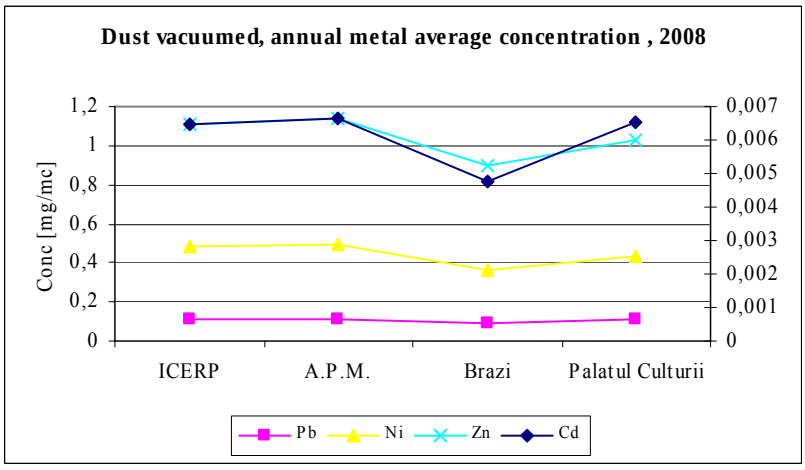

Fig. 4. Particulate sucked metals annual average concentrations - 2008

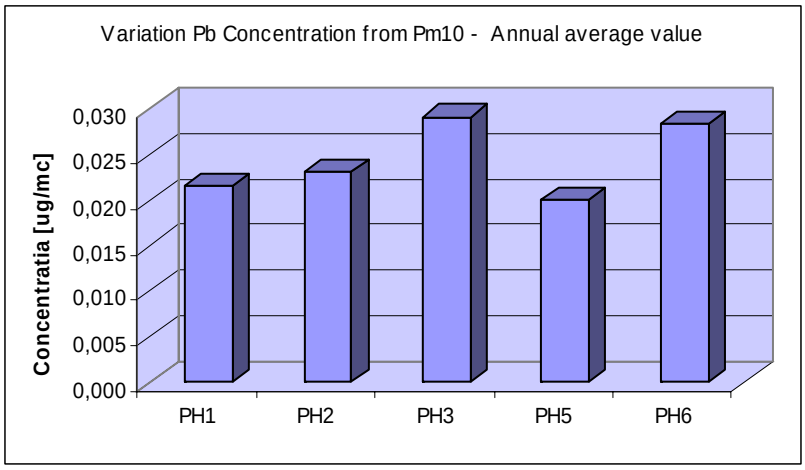

Fig. 5. PM10 - lead indicator variation, 2008

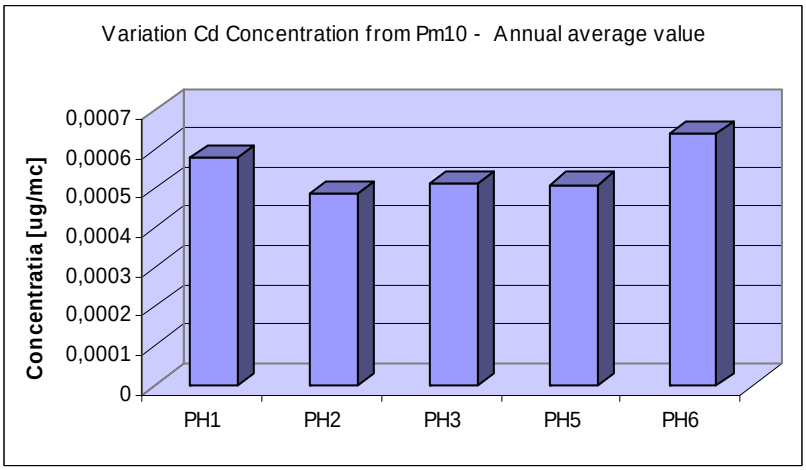

Fig. 6. PM10 - indicator variation cadmium, 2008

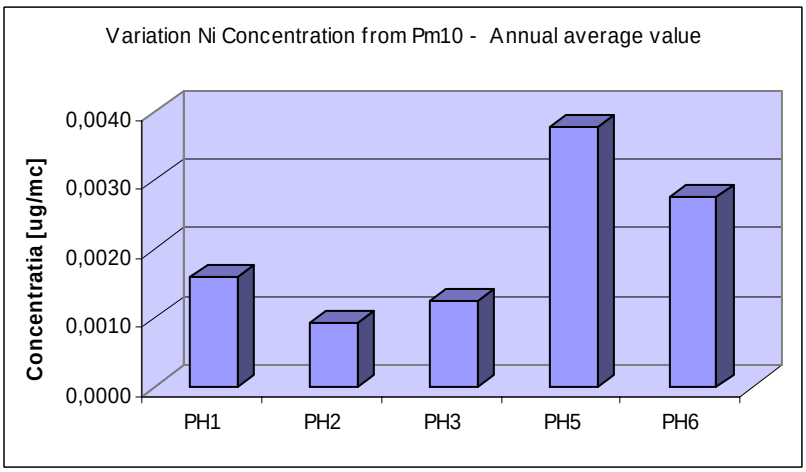

Fig. 7. PM10 - nickel indicator variation, 2008

Average content of pollutants and chemical components of particulate sedimentary deposits vary depending on the complexity of this industry in that area. So dust deposits in the south of the city, resulting in the sampling point: St. Raf. Corlatesti have a higher concentration of the chemical elements compared with other sampling points.

Carbon Monoxide

There were no exceedances of the limit value for human health (10 mg/m^3, calculated as the maximum daily averages eight hours).

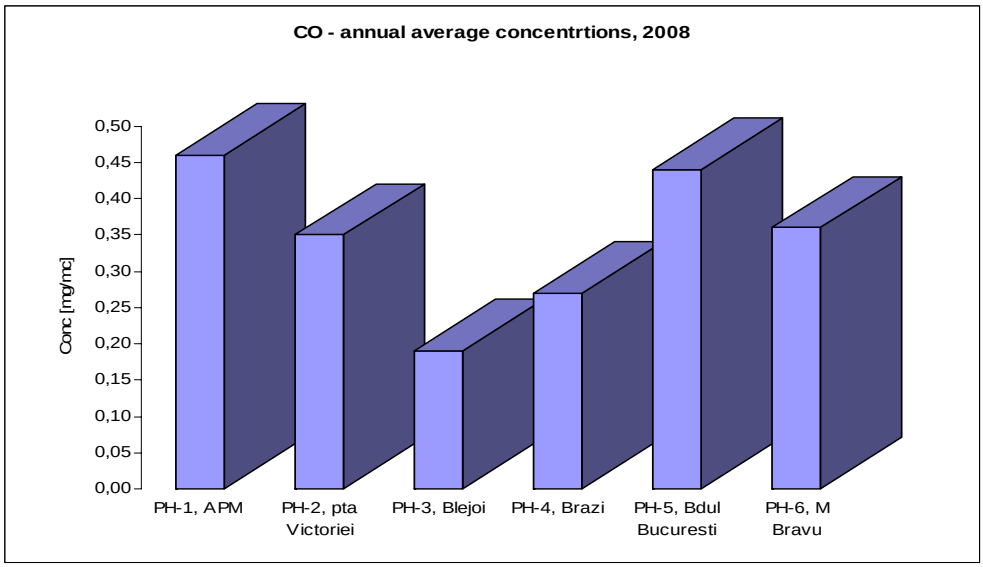

Fig. 8. Changes in annual average concentrations, CO – 2008

Highest concentrations were recorded in traffic stops.

Benzene

Annual average concentration of benzene did not exceed the annual limit value for human health plus the tolerance margin (7.5 mg / cm) at monitoring stations

Ammonia

The concentration of ammonia in ambient air are reported to STAS 12574/87 "Air in Protected Areas" which provides a concentration of 0.1 mg/m^3 on daily average value. In 2008 there were exceedances of daily maximum permitted concentration in Ploiesti.

Ozone

Ozone is allotropic form of oxygen molecule with three atoms formed. Ozone is of two types:
• stratospheric, which absorbs ultraviolet radiation, protecting life on Earth (90% of total ozone);
• troposphere, strong irritant action secondary pollutant (10% of total ozone). Tropospheric ozone is highly toxic and is the main pollutant of the atmosphere industrialized countries and cities as its precursors from industrial activities and traffic.

There were no exceedances of the threshold (240 mg / m average hourly for three hours consecutively). Exceedances were recorded daily maximum concentration of 8-hour averages for all 4 stations ambient air quality monitoring. The annual number of exceedances is greater than 25 stațiille: PH2 (28), PH4 (32) and PH6 (49).

Evolution of Air Quality

Following tests carried out during January-December 2008 compared with the period January to December 2007 is noted: Increases in annual average values of measured pollutants: formaldehyde, ammonia- Decreases in annual average values of measured pollutants: hydrogen sulfide sampling point exception Obstetrics and Gynecology Hospital, sulfur dioxide, nitrogen dioxide, particulate vacuum cleaner.

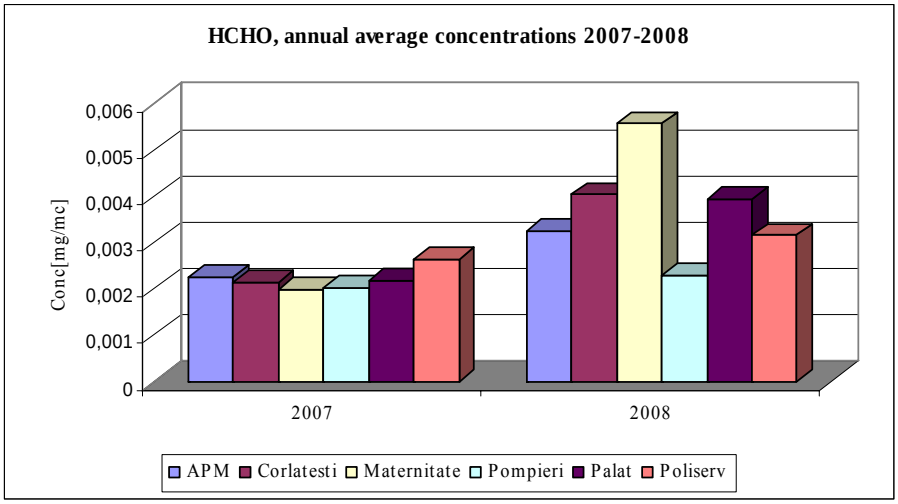

Fig. 9. Changes in annual average concentration - formaldehyde, from 2007 to 2008

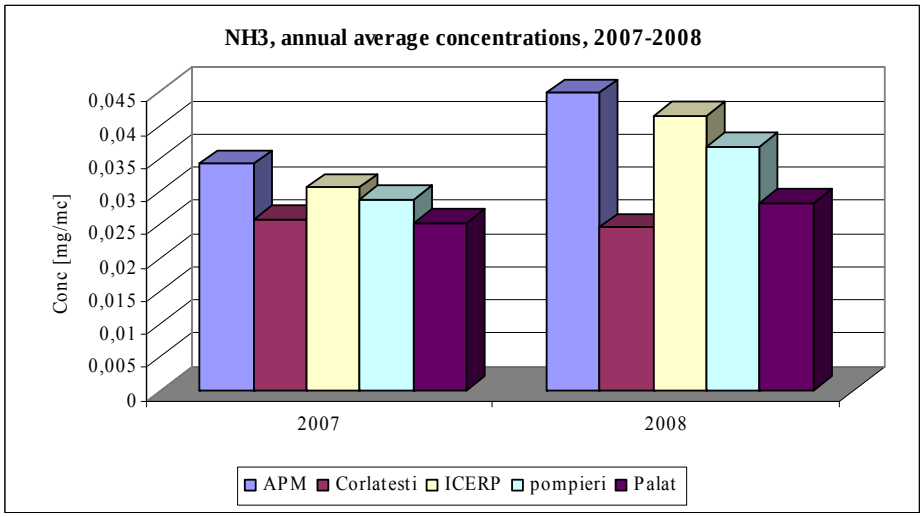

Fig. 10. Changes in annual average concentration - ammonia, from 2007 to 2008

Laboratory monitored the concentration of particles depositing in the five points of Ploiesti. Settled particles resulting from mechanical, building roads, training ground as a result of motor vehicles, some industries such as metallurgy, building materials industry or as a result of soil erosion action.Settled dust monitored monthly shows monthly average concentrations exceeded the EPA points and St. Corlatesti.

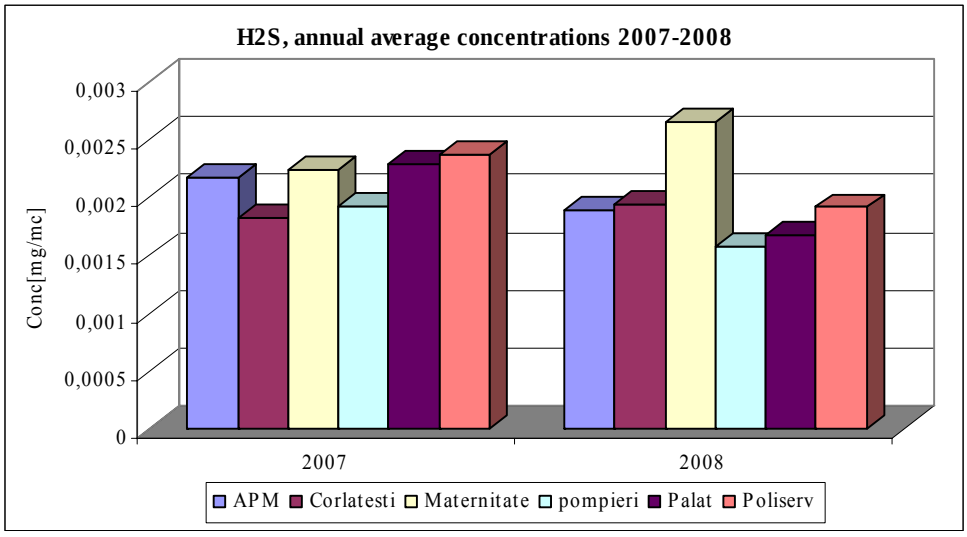

Fig. 11. Changes in annual average concentration - hydrogen sulfide, from 2007 to 2008

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Calitatea aerului ambiental

Rezumat

In lucrare este prezentata calitatea aerului in judetul Prahova ca urmare a monitorizarii prin statii de monitorizare manuale si automate.