



Original paper

## Implementation of the directives concerning the management of the air quality in 6 North – West region

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### Abstract

The action of monitoring of the air quality is useful because it directly provides informations concerning the situation recorded in one moment in an important segment of the urban environment. The monitoring data obtained from the survey network and control system allow the identification of the polluted areas and rapid taken of the strategical and tactic measurements of fight against pollution and prevention of pollution strengthening. The analyze of the recorded results obtained from the stations of monitoring the air quality from the 6 North – West Region in 2007 show an improvement of the air quality compared to previous years, as consequence of investments made for reducing the emission in atmosphere of pollutants resulted from the industrial sector.

*Keywords:* air quality, monitoring network, monitoring stations, monitoring indicators

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### 1. Introduction

The air is the environmental factor which represents the most rapid support favorizing the transport of the pollutants in environment. As consequence, its pollution has influence on the population health and can produce damages of the flora and fauna, generally.

The European Directives in the field of the air pollution, meaning the Council Directive no. 96/62/CE concerning the evaluation and management of the ambient air (Frame - Directive) and also the 3 daughter Directives concerning the limit values for different pollutants from the ambient air are transposed

in national legislation through a series of normative. The air quality is determined by the emissions in air from the stationary and mobile (road traffic) sources, in big towns preponderantly, and from the transport of the pollutants at long distances. Due to those reasons, the activity of surveillance and improvement of air quality receives special attention.

The control of the air quality is the concept that characterizes the process of quantitative, qualitative and repetitive observation and measurement of the concentration of one or more air constituents. The national action plan in the field of atmospheric protection approved by the HG no. 738/2004, settles measures which must be taken with the aim of reaching the key objectives of the National Strategy for the

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atmospheric protection. The achievement of the actions also involves obligations from the responsible of the activities which use sources of pollutants emissions in atmosphere.

According to the Annual Report Concerning the State of the Environmental Factors for 2007, automatic air quality monitoring stations were installed in counties of Bihor, Bistrița Năsăud, Maramureș, Satu Mare and Sălaj (beginning with 2006, the county of Cluj begun the monitoring of the air quality with the automatic stations).

**2. Material and method**

The National Action Plan in the field of the atmospheric protection approved by the HG no. 738/2004, settles measures that must be taken with the aim of reaching the key objectives of the National Strategy for the Atmosphere Protection. The achievement of the actions also involves obligations from the responsible of the activities which use sources of pollutants emissions in atmosphere.

The data obtained from the surveillance network and control system allow the identification of the polluted area and rapid put into practice of the strategic and tactic measures of fight against pollution and prevention of pollution accentuation. The network of surveillance of the air quality was placed in order to monitor the cumulated effect of the industry, traffic, warming of the housing and commercial spaces.

The monitored pollutants, measurement methods, limit values, alert and information thresholds are established by the national legislation concerning the atmospheric protection, according to the requirements foreseen by the European regulations.

Presently, RNMCA performs continuous measurements of sulfur dioxide (SO<sub>2</sub>), nitrogen oxides (NO<sub>x</sub>), carbon monoxide (CO), ozone (O<sub>3</sub>), material particles (PM<sub>10</sub> and PM<sub>2,5</sub>), benzene, lead. The automatic stations of monitoring air quality from the counties of Bihor, Bistrița Năsăud, Maramureș, Satu Mare and Sălaj, which were installed in 2007 were not functional, but in the end of the year. In this way, the analyzes of the air quality monitoring were performed, in 2007 too, by air prelevation with aspiration pumps with know volume and flow counters, followed y the manual chemical analyze, in laboratories of the AEP according to present standards requirements.

**3. Results and discussions**

A monitoring station delivers representative data concerning the air quality for a specific area around the station. The area where the concentration does not differ from the concentration measured at the station more than a “specific quantity” (+/-20%) is named “representative area”.

The monitoring network and results obtained based on the analyzes during the testing period, in 2007, according to the Annual Report concerning the state of the environmental factors for the 6 North – West Region, are detailed in table 1. Majority of the monitored indices frames within the limits admitted by the present legislation. Among heavy metals emissions reported at regional level, the most important share in 2007 was recorded in county of Maramureș with 83.53% of total emissions, due to the leader production. The annual average Pb air concentration in the county of Maramureș was of 1.166 µg/m<sup>3</sup> in 2007 (compared to 2.025 µg/m<sup>3</sup> in 2006), and Cd of 0.014 µg/m<sup>3</sup> (compared to 0.015 µg/m<sup>3</sup> in 2006).

Table 1. Station of monitoring the air quality in 6 NV Region

County	Town	Station	Type of station	Type of pollutant	No. det.	Concentration			Frequency of obtaining values over the LM of MAC	Obs
						Daily	Annual	MU		
BH	Oradea	AEP Bihor	manual	SO <sub>2</sub>	166		0.0008	mg/m <sup>3</sup>	0%	
				NO <sub>2</sub>	166		0.0127	mg/m <sup>3</sup>	0%	
				Particulate matter	174		0.0442	mg/m <sup>3</sup>	0%	
		Children hospital		SO <sub>2</sub>	170		0.0014	mg/m <sup>3</sup>	0%	
				NO <sub>2</sub>	170		0.0152	mg/m <sup>3</sup>	0%	
				Particulate matter	195		0.0337	mg/m <sup>3</sup>	1.025%	
Faculty of	SO <sub>2</sub>	142		0.0010	mg/m <sup>3</sup>	0%				

		Environmental Protection		NO <sub>2</sub>	142		0.0162	mg/m <sup>3</sup>	0%		
				Particulate matter	195		0.0413	mg/m <sup>3</sup>	0.512%		
BN	Bistrița	Bistrița		SO <sub>2</sub>			1.6692	μg/m <sup>3</sup>			
				NO <sub>x</sub>			8.4715	μg/m <sup>3</sup>			
				NO <sub>3</sub>			26.3859	μg/m <sup>3</sup>			
				Sedimented particles			4.0431	g/mp/month			
				pH precipitations			7.54				
			Urbana SA		SO <sub>2</sub>	344	1.27355		μg/m <sup>3</sup>	0	
				NO <sub>x</sub>	348	8.4336		μg/m <sup>3</sup>	0		
				NH <sub>3</sub>	351	32.0008		μg/m <sup>3</sup>	1.72		
			Iproeb SA		SO <sub>2</sub>	352	2.87497		μg/m <sup>3</sup>	0.28	
				NO <sub>x</sub>	356	13.9485		μg/m <sup>3</sup>	0		
				NH <sub>3</sub>	353	27.2289		μg/m <sup>3</sup>	1.42		
			AEM		SO <sub>2</sub>	256	1.60205		μg/m <sup>3</sup>	0	
				NO <sub>x</sub>	360	6.16463		μg/m <sup>3</sup>	0		
				NH <sub>3</sub>	363	18.6342		μg/m <sup>3</sup>	0		
				Sedimented particles	12		3.2334	g/mp/month	0		
		PM 10		313	26.498		μg/m <sup>3</sup>	5.75	Data capture 86.94%		
				pH	38		7.57		0		
		Hotel Diana		SO <sub>2</sub>	355	0.92402		μg/m <sup>3</sup>	0		
			NO <sub>x</sub>	360	5.39858		μg/m <sup>3</sup>	0			
			NH <sub>3</sub>	363	27.8884		μg/m <sup>3</sup>	0			
		Mefil SA		Sedimented particles	12		6.1629	g/mp/month	0		
		Aquoabis Storage		pH precipitations	38		7.51		0		
		Municipal SV		Sedimented particles	12		4.3646	g/mp/month	0		
	Eteo Station		Sedimented particles	12		2.4115	g/mp/month	0			
	Beclean	City Hall		SO <sub>2</sub>	6	0.00521		μg/m <sup>3</sup>	0		
			NO <sub>x</sub>	6	0.20783		μg/m <sup>3</sup>	0			
			NH <sub>3</sub>	6	0.14548		μg/m <sup>3</sup>	16.67			
	Euration Station		Sedimented particles			4.6189	g/mp/month	0			
	Năsăud	City Hall		SO <sub>2</sub>	6	0.00155		μg/m <sup>3</sup>	0		
			NO <sub>x</sub>	6	0.01353		μg/m <sup>3</sup>	0			
			NH <sub>3</sub>	6	0.04826		μg/m <sup>3</sup>	0			
	Euration Station		Sedimented particles			5.2443	g/mp/month	0			
	Sângerorz-Băi	Town Park		SO <sub>2</sub>	6	0.00106		μg/m <sup>3</sup>	0		
			NO <sub>x</sub>	6	0.03465		μg/m <sup>3</sup>	0			
			NH <sub>3</sub>	6	0.09846		μg/m <sup>3</sup>	16.67			
	Euration Station		Sedimented particles			4.1003	g/mp/month	0			
	Lechința	City Hall		SO <sub>2</sub>	6	0.00533		μg/m <sup>3</sup>	0		
			NO <sub>x</sub>	6	0.02293		μg/m <sup>3</sup>	0			
			NH <sub>3</sub>	6	0.15956		μg/m <sup>3</sup>	16.67			
			Sedimented particles			4.3254	g/mp/month	0			
	Rodna	City Hall		SO <sub>2</sub>	6	0.00271		μg/m <sup>3</sup>	0		
			NO <sub>x</sub>	6	0.06486		μg/m <sup>3</sup>	16.67			
			NH <sub>3</sub>	6	0.18038		μg/m <sup>3</sup>	33.33			
	Euration		Sedimented particles			3.7227	g/mp/month	0			
	Poiana Ilvei	Particular house		Sedimented particles			2.2913	g/mp/month	0		
	Prundul Bârgăului	City Hall		Sedimented particles			5.8331	g/mp/month	0		

CJ	Cluj-Napoca	A. Vlaicu	trafic	SO <sub>2</sub>	2663	invalidated	µg/m <sup>3</sup>	0	
				NO	2720	invalidated	µg/m <sup>3</sup>	0	
				NO <sub>2</sub>	2720	invalidated	µg/m <sup>3</sup>	0	
				NOx	2696	invalidated	µg/m <sup>3</sup>	0	
				CO	2830	invalidated	mg/m <sup>3</sup>	0	
				BENZENE	2318	invalidated	µg/m <sup>3</sup>	0	
				TOLUENE	2324	invalidated	µg/m <sup>3</sup>	0	
				o-XILENE	2099	invalidated	µg/m <sup>3</sup>	0	
				Etilbenzene	2318	invalidated	µg/m <sup>3</sup>	0	
				m- p-XILENE	2100	invalidated	µg/m <sup>3</sup>	0	
				PM <sub>10</sub>	122	invalidated	µg/m <sup>3</sup>	0	
				Pb	122	invalidated	µg/m <sup>3</sup>	0	
	Nicolae Balcescu High school	urban	SO <sub>2</sub>	5371	invalidated	µg/m <sup>3</sup>	0		
			NO	6969	24.739	µg/m <sup>3</sup>	0		
			NO <sub>2</sub>	6978	48.293	µg/m <sup>3</sup>	0		
			NOx	7023	84.604	mg/m <sup>3</sup>	0		
			BENZENE	5896	invalidated	µg/m <sup>3</sup>	0		
			TOLUENE	5805	invalidated	µg/m <sup>3</sup>	0		
			o-XILENE	5271	invalidated	µg/m <sup>3</sup>	0		
			Etilbenzene	3505	invalidated	µg/m <sup>3</sup>	0		
			m- p-XILENE	4996	invalidated	µg/m <sup>3</sup>	0		
			PM <sub>10</sub>	315	41.8168	µg/m <sup>3</sup>	33.33%		
			Pb	315	0.02572	µg/m <sup>3</sup>	0		
			Grigorescu	suburban	SO <sub>2</sub>	5557	invalidated	µg/m <sup>3</sup>	0
	NO	6943			30.287	µg/m <sup>3</sup>	0		
	NO <sub>2</sub>	6921			24.972	µg/m <sup>3</sup>	0		
	NOx	6930			78.16	mg/m <sup>3</sup>	0		
	CO	1916			invalidated	µg/m <sup>3</sup>	0		
	O <sub>3</sub>	1768			invalidated	µg/m <sup>3</sup>	0		
	PM <sub>10</sub>	363			39.4487	µg/m <sup>3</sup>	21.7		
	Pb	363			0.02377	µg/m <sup>3</sup>	0		
	Dambovita st.	industrial	SO <sub>2</sub>	2142	invalidated	µg/m <sup>3</sup>	0		
			NO	5828	invalidated	µg/m <sup>3</sup>	0		
			NO <sub>2</sub>	5879	invalidated	µg/m <sup>3</sup>	0		
			NOx	5827	invalidated	µg/m <sup>3</sup>	0		
			O <sub>3</sub>	6144	33.778	µg/m <sup>3</sup>	0		
	Dej	Dej	urban	SO <sub>2</sub>	6670	invalidated	µg/m <sup>3</sup>	0	
				NO	8270	10.841	mg/m <sup>3</sup>	0	
				NO <sub>2</sub>	8270	20.42	µg/m <sup>3</sup>	0	
				NOx	8269	35.602	µg/m <sup>3</sup>	0	
				CO	8398	0.307	µg/m <sup>3</sup>	0	
				O <sub>3</sub>	8296	51.157	µg/m <sup>3</sup>	12.88	
BENZENE				5209	invalidated	µg/m <sup>3</sup>	0		
TOLUENE				5422	invalidated	µg/m <sup>3</sup>	0		
o-XILENE				4028	invalidated	µg/m <sup>3</sup>	0		
Etilbenzene				4773	invalidated	µg/m <sup>3</sup>	0		
m. p-XILENE				4433	invalidated	µg/m <sup>3</sup>	0		
PM <sub>10</sub>				234	38.7389	µg/m <sup>3</sup>	24.36		
Pb				234	0.01454	mg/m <sup>3</sup>	0		
MM				Baia Mare	4	ind.	SO <sub>2</sub>	363	3
	TSP	364	50				µg/m <sup>3</sup>	0	STAS 12574/87
	Pb (TSP)	363	1.906				µg/m <sup>3</sup>	75	STAS 12574/87
	Cd (TSP)	364	0.018				µg/m <sup>3</sup>	30	STAS 12574/87
	PM <sub>10</sub>	354	45				µg/m <sup>3</sup>	30	OM 592/2002
	Pb (PM <sub>10</sub> )	351	1.806				µg/m <sup>3</sup>	-	
	Cd (PM <sub>10</sub> )	352	0.022				µg/m <sup>3</sup>	38	STAS 12574/87

		16	ind	SO <sub>2</sub>	362		26	µg/m <sup>3</sup>	0	OM 592/2002
				TSP	361		55	µg/m <sup>3</sup>	0	STAS 12574/87
				Pb (TSP)	361		1.429	µg/m <sup>3</sup>	66	STAS 12574/87
				Cd (TSP)	360		0.020	mg/m <sup>3</sup>	35	STAS 12574/87
		19	urban	SO <sub>2</sub>	356		4	µg/m <sup>3</sup>	0	OM 592/2002
		23	urban	SO <sub>2</sub>	355		7	µg/m <sup>3</sup>	0	OM 592/2002
		29	urban	SO <sub>2</sub>	241		5	µg/m <sup>3</sup>	0	OM 592/2002
				NO <sub>2</sub>	219		10	µg/m <sup>3</sup>	-	
				NH <sub>3</sub>	219		6	µg/m <sup>3</sup>	0	STAS 12574/87
		31	urban	SO <sub>2</sub>	355		4	µg/m <sup>3</sup>	0	OM 592/2002
				TSP	358		29	µg/m <sup>3</sup>	0	STAS 12574/87
				Pb (TSP)	357		0.148	µg/m <sup>3</sup>	4	STAS 12574/87
				Cd (TSP)	358		0.004	µg/m <sup>3</sup>	1.7	STAS 12574/87
				NO <sub>2</sub>	355		15	µg/m <sup>3</sup>	-	
NH <sub>3</sub>	354				18	µg/m <sup>3</sup>	0	STAS 12574/87		
36	urban	SO <sub>2</sub>	360		21	µg/m <sup>3</sup>	0	OM 592/2002		
SM	Satu-Mare*	AEP quarter								
		Meteo Station								
		Ioan Slavici High school	urban							
SJ	Zalău	AEP	SO <sub>2</sub>	202	0.0263	0.0046	µg/m <sup>3</sup>	0		
			NO <sub>2</sub>	202	0.0185	0.0064	µg/m <sup>3</sup>	0		
			NH <sub>3</sub>	202	0.0212	0.0107	µg/m <sup>3</sup>	0		
		Meteo Station	SO <sub>2</sub>	202	0.0168	0.0024	µg/m <sup>3</sup>	0		
			NO <sub>2</sub>	202	0.0168	0.0065	µg/m <sup>3</sup>	0		
			NH <sub>3</sub>	202	0.0239	0.0123	µg/m <sup>3</sup>	0		

#### 4. Conclusions

In 2007, within the 6 North – West region, an improvement of the air quality was recorded, as consequence of investments for reducing the emissions in atmosphere of the pollutants resulted from the industry:

- The economical agents realized the installation modernizing, their maintenance, and took measurements for removing pollution and cleaning the locations, supplying emissions auto monitoring stations, inclusively (SC Rominserv SA Zalău, SC Romplumb SA Baia Mare, etc).
- By including the installations which produce large pollutants quantities under the incidence of different EU Directives (IPPC, IMA, COV, SEVESO) both surveillance and responsibility degrees of the owners of these installations, concerning the produced emissions, increased.
- The industrial installations which use organic solvents which are included under the incidence of the legislation concerning the COV limitations took measures concerning the substantial reducing of the COV and framing within the admitted emission values. In this way the non metallic COV decrease by 10.6 folds in 2007 compared with 2006 can be explained.

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