

## **ENGLISH VERSION: USAGE OF INFORMATIONAL TECHNOLOGIES FOR SOLUTION OF HYGIENIC CHALLENGES IN THE AREA OF ATMOSPHERIC AIR\***

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*Implementation of probabilistic evaluations of atmospheric air pollution impact on health of the population and information-analytical system usage for hygienic assessment of atmospheric air quality becomes the basis for scientific substantiation provision, system and complex approach to the solution of atmospheric air protection challenges. Application of information-analytical system for collecting and keeping of information (geocoding of stationary sources, meteorfiles preparation, inputting of digitized data about reliefs, determination of distance to locations of dwelling and social objects) allows to conduct evaluation of risk for health of the population from pollution of atmospheric air at local level, to determine the lists of "priority-driven" pollutants, which are subject of regulation in the specific region under consideration at determination of the so called "hot spots" taking into consideration the emissions' toxicity and territorial peculiarities of pollution.*

Key words: atmospheric air, informational technologies, hygienic challenges.

### **Introduction**

The current development stage of environmental protection sphere is characterized by increasing of its own role in general system for preservation and promotion measures in improvement of health of Ukrainian population which has significantly worsened over the last ten years [1]. Economic reforming and extensive scientific and technological progress brought increasing of air burden, that led in its turn to the changes in industrial emissions' qualitative structure and wider range of natural and artificial substances usage in many technological processes of industrial enterprises [2,3,4]. According to the World Health Organization estimates, which were done for EEC region (including EEC member States from North America), air pollution is the cause of 576.000 premature human deaths associated with cardiovascular and cerebrovascular diseases, lung cancer and diseases of the respiratory system [5]. The main contributors in overall air pollution of Ukraine are industrial utilities [6], among which according to the types of economic activity leading position belongs to the metallurgical industry. To reduce emissions of pollutants into atmospheric air, the series of multilateral international legal agreements and regulations were introduced and implemented in Ukraine. The main tasks of these documents are striving against atmospheric air pollution and preventing air pollution impact on public health. The basic documents among the above mentioned ones are the following: Convention on Long-range Transboundary Air Pollution, Convention on Environmental Impact Assessment in a Transboundary Context, Council Directive 2008/50/EC "On ambient air quality and cleaner air for Europe", Law of Ukraine "On the main directions of State policy of Ukraine in the area of environment protection, natural resources usage and ecological safety (paragraph 29, Resolution of the Verkhovna Rada of Ukraine as of 05.03.1998 No 188/98-VR); National Action Plan for Environmental Protection of Ukraine for the period of 2011-2015 (By-Law of Cabinet of Ministers of Ukraine 577-b as of 25.05.2011), National Environmental Policy Strategy of Ukraine on the period till 2020 (Law of Ukraine 2818-VI as of 21.12.2010) and Protocol on Strategic Environmental Assessment (law of Ukraine 562-VIII as of 01.07.2015). But unfortunately, they are just of informative "populist" nature, which is primarily due to the imperfection of the Law of Ukraine

"On system of licensing in the sphere of economic activity" (2806-IV as of 06 September 2005). According to this Law, the challenge of air pollution impact on public health assessment is considered only on the stage of obtaining by industrial enterprise of authorization for emissions under section for sanitary protection zone size substantiation. Similar issues (about the lack of assessments in impact on the health of population) arise during working out and approving of standards on maximum allowable emissions of pollutants from stationary sources and achieving by these sources of technological standards on allowable emissions, according to the international requirements [7]. At this, estimation of emissions' toxicity remains outside of regulatory and controlling authorities spotlight [8]. This is conditioned by inefficiency of the monitoring system (fragmentation of observation data obtaining by Hydrometeorological center, State Sanitary Epidemiological Service of Ukraine and environmental services, imperfect statistic forms) and usage for analysis of air pollution criteria approach, which is conducted in accordance with the concept of "zero" risk and ignores chronic aerogenic effects of pollutants on the health of exposed population over a lifetime.

### **Research methods:**

- bibliographic method of scientific information analysis, system and comparative analysis;
- sanitary and epidemiological expertise;
- mathematical (assessment of risk for the health of population, modeling);
- mapping (geocoding of emissions' stationary sources and population by means of geoinformation systems of ArcGis 9.3, using high resolution data).

### **Results of the research**

In the world practice (taking into consideration practical experience of the USA, EU and CIS countries) similar challenges receive effective solutions by means of methodology in assessment of risk for the health of population [WHO, US EPA]. For this reason, using the methodology in assessment of risk for the health of population, forecasts are made up, preventive and environment protection measures are worked out. These measures most effectively reduce the risk for the health of population (due to total reducing of emissions amount,

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working out and substantiation of technological standards on allowable emissions, harmonization of hygienic standards, etc.) up to acceptable level by the force of pollution territorial peculiarities and minimal financial expenses consideration. Analyzing the above mentioned aspects, we may affirm that national policy in the area of protection and governing of atmospheric air quality requires cardinal changes regarding the part of execution by Ukraine of its international obligations. First of all, considerable changes should be done in Law of Ukraine "On system of licensing in the sphere of economic activity" (2806-IV as of 06 September 2005), Law of Ukraine "On objects of increased hazard" (2245-III as of 18 January 2001) and Law of Ukraine "On provision of sanitary and epidemiological well-being of population", by implantation of probabilistic evaluation of air pollution impact on health of the population and using software for collecting, processing, keeping and analysis of information about formation of airogenic risk for the health of the population.

Existing informational sources do not provide possibility to receive necessary data for conducting of evaluation and analysis of risk for the health of populations who get involved in the risk zone.

Application of information-analytical system for collecting and keeping of information (geocoding of stationary sources, meteofiles preparation, inputting of digitized data about reliefs, determination of distance to locations of dwelling and social objects) allows to conduct evaluation of risk for health of the population from pollution of atmospheric air at local level, to determine the lists of "priority-driven" pollutants, which are subject of regulation in the specific region under consideration at determination of the so called "hot spots" taking into consideration the emissions' toxicity and territorial peculiarities of pollution.

## Conclusion.

Implementation of probabilistic evaluations of atmospheric air pollution impact on health of the population and information-analytical system usage for hygienic assessment of atmospheric air quality becomes the basis for scientific substantiation provision, system and complex approach to the solution of atmospheric air protection challenges.

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