

TECHNOLOGICAL LOAD ON THE NATURAL ENVIRONMENT OF THE MYKOLAIV REGION: PROBLEMS, SOLUTION WAYS

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Introduction. Human activity is related to the production and development of the man-made sphere for the good of man. But at the same time, such activity pollutes the environment, in particular the atmosphere of cities where citizens live. The presence of the number of pollutants depends on the number and intensity of work of industrial enterprises [1], the operation of vehicles, the fulfillment of environmental and nature protection requirements, etc.

Description of research methodology. Such a problem exists in industrial regions, including Mykolaiv region. Paradoxically, the Mykolayiv region has no chemical and coal industry enterprises, but every year the region is included in the list of regions with sufficient atmospheric pollution; the level of man-made load on the natural environment of the Mykolaiv region is significantly lower than the average for Ukraine, but the indicators of pollutants released into the atmosphere are very close to the average indicators for Ukraine. This dynamic is getting worse every year [2].

The main threat to the population of the cities of the region is stationary sources of pollution, these are eleven enterprises that annually emit pollutants into the atmosphere, the volume of which exceeds 100 tons per year (enterprise JSC «Distribution system operator Mykolayivgas», JSC GTRPC «Zorya» - «Mashproekt», Mykolaiv alumina refinery company limited, Regional Communal Enterprise «Mykolaivoblteploenergo», Yugcement Open Joint-Stock Company, LLC AE «NIBULON», LLC «Bandura Oil Extraction Plant», PJSC «Mykolaivska CHP», LLC «Specialized sea port NIKA-TERA», LLC «EKOTRANS»). Of the total number of enterprises in the Mykolayiv region, the number of these enterprises is 3.0%, but the volume of emissions is 64.7% of the volume of emissions of all enterprises.

Another problem is road transport, which should be considered as an object of air pollution, but for some reason it is not paid attention to.. One liter of fuel (gasoline, diesel) produces approximately 16 m³ of exhaust gases, which contain about 200 harmful substances. Given that the Mykolaiv region and the cities of Mykolaiv, Voznesensk, Pervomaisk, Yuzhnoukrainian and others are connected by the Z-06, M-05, M-14, M-18 highways, we observe an excess of the maximum permissible concentrations of such toxicants as phenol, benzopyrene, etc. .

In recent years, the tension on the highways of the region has become even more intense. Freight transport goes along highways through populated areas to the ports of the southern region of the country. This is a large amount of freight transport - from 18 to 55 thousand trucks per year. Without any control, a large amount of such transport accumulates on the streets of many settlements and suburban areas.

This situation is the reason for the accumulation of formaldehyde, which is one of the most dangerous air pollutants (carcinogen) [3]. It causes somatic mutations that are passed on to the younger generation, has mutagenic and carcinogenic effects, as well as embryotoxicity. In addition, the negative impact of formaldehyde is enhanced by nitrogen dioxide, which is a significant environmental risk factor for the population of many cities and settlements in the Mykolaiv region.

Specialists of the State Environmental Inspection of the South-Western District note that long-term exposure to formaldehyde concentrations develops respiratory problems in which allergic manifestations occur. High concentrations of formaldehyde increase the risk of developing respiratory tract cancer, and the child's body is very sensitive to the harmful effects of this compound.

Referring to the data of the Ukrainian Hydrometeorological Center, we note that the maximum permissible concentration (MPC) of formaldehyde in Ukraine is equal to 0.003 mg/m³, but in the city of Mykolaiv this indicator is more than 2.5 MPC. The situation can be improved by the presence of green plants (trees) [4], they can significantly reduce the concentration of formaldehyde in the air (up to 23%). By absorbing formaldehyde, tree leaves, trunks and roots, by purifying the air from pollutants, not only reduce the level of formaldehyde in the air, but also convert it into safe substances with the help of photosynthesis and metabolism. But, unfortunately, the amount of green space in 2022/2023 in the city of Mykolaiv and other suburban areas was sharply reduced due to cutting down trees.

During the second half of 2023 and the beginning of 2024, the eco-organization Save Dnipro recorded in Mykolaiv the highest concentration of formaldehyde in the air among the cities of Ukraine. According to the estimates of the USA Environmental Protection Agency (EPA), exceeding the average daily maximum permissible concentration of formaldehyde can lead to a dozen diseases, in particular, if a person constantly breathes air saturated with formaldehyde with a concentration of 0.008 mg/m³ throughout his life, he will have no more one chance (theoretically) in ten thousand of getting cancer.

Currently, in such cities of Ukraine as: Mykolaiv, Odesa, Lviv, Dnipro, Kremenchuk, Kamianske, Cherkasy, Kryvyi Rih, a significant excess of average daily concentrations is recorded, that is, the health risk in these cities is significantly higher. The sources of the formation and distribution of formaldehyde in the air in populated areas are both natural and anthropogenic. The most dangerous anthropogenic air pollutants with formaldehyde are industrial enterprises [5]: thermal power stage, thermal power plants, waste incineration plants, both cars and trucks with internal combustion engines.

As a result of photochemical reactions of other pollutants present in the atmosphere, formaldehyde is also formed, and this contributes to its increase in high background pollution. Under certain weather conditions, the concentration of formaldehyde in the surface layer of air can increase. That is why ecologists in 2024 record characteristic peaks of pollution in some cities and towns, in particular the city of Mykolaiv.

Unfortunately, the climatic and meteorological conditions of the city of Mykolaiv, especially in summer, do not contribute to the improvement of the situation due to the dilution and movement of harmful impurities. High temperatures in the summer, insufficient amount of constant winds in the region, constantly increased transit of multi-tonnage trucks only contribute to an increase in the level of formaldehyde and other pollutants.

The state of the atmospheric air is monitored (observation) in the city of Mykolaiv by the Mykolaiv Regional Center for Hydrometeorology. As part of the surveillance, monitoring by specialists is carried out at four control points for pollutants: carbon monoxide, hydrogen fluoride, nitrogen dioxide, dust, formaldehyde, nitrogen oxide, sulfur dioxide. According to the results of the research, the results are disappointing.

Results and conclusions. A comprehensive assessment of air pollution indicators in the city of Mykolaiv shows that the city constantly ranks high in the ranking of the most polluted cities of Ukraine, having negative indicators of atmospheric air pollution that are constantly worsening. The average annual growth rate of atmospheric pollution corresponds to the indicator of 1.0. Such a situation in Mykolaiv in the future may lead to not just high, but even very high pollution levels.

It is already necessary to solve a number of environmental problems related to the reduction of traffic flows, especially heavy-duty trucks; strengthening control over the fulfillment of environmental and nature protection requirements for stationary sources of pollution. Due to the reduction of the maximum permissible concentrations of dangerous pollutants, the environmental risks for the population of the cities of Mykolaiv region must be significantly reduced.

Keywords: atmosphere of the city, negative impact, permissible concentration, ecology.

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