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Assessment of the Impact of the Air Transport Processes on Soil Contamination With Petroleum Products

The authors analyze the problem of soil pollution in the territory adjacent to the airport. The results of the study of the level of soil pollution with petrochemicals at the territory adjacent to the airport are presented.

Introduction. The increase in the intensity of air transport processes leads to the increasing of the impact on the environment. In particular, during the operation of modern airports. Which are characterized with the presence of both physical and chemical factors of negative impact on the environment. It is known [1-3] that the soil at the territories of the airports and at the adjacent territories is characterized with contamination with petrochemicals and heavy metals.

The main sources of soil pollution with oil products at the airport territory include surface runoff from the airport territory, the aviation and technical base, fuel and lubricant service facilities, places where the technological operations of refueling of transport with fuel and lubricants are performed.

Therefore, the purpose of our research was to determine the level of soil pollution with oil products at the territory adjacent to the airport, located within the metropolis. The object of the study is the territory within 2 km adjacent to the International Airport "Kyiv".

The choice of the object for research is justified by the location of the airport within the city limits and the lack of the possibility of clearly complying with regulatory requirements regarding the size of the sanitary and protective zone around the airport, which confirms the importance of determining the ecological condition of the soils in the territory adjacent to the "Kyiv" airport [4].

Research methods and techniques. Control of the level of soil pollution in the area of the airport was carried out taking into account the meteorological conditions, the topography of the area, as well as the special characteristics of the area where the aviation enterprise is located [5].

During sampling, two sites were identified for research. One of them is experimental, located in the zone of influence of air transport processes, and the other is control, located in an area not loaded with technology. The soil samples taken at the control site had the same natural composition as the test sample.

The object of the study were soil samples, selected according to the standard method with a size of 5X5 m, at different distances from the airport runway and on the

territory of the park (control sample). Further, combined samples were formed. In general, 6 soil samples were formed to determine the concentration of petrochemicals.

The concentration of petroleum products in the formed soil samples was determined using the gravimetric method No. 081/12-0116-03 "Soils. Methodology for measuring the mass fraction of petroleum products by the gravimetric method" [6].

This research method consists of the following stages: extraction of organic substances from soil samples (prepared accordingly from selected soil samples); dissolution of the residue, after evaporation of chloroform, in hexane; then separation of polar compounds on a column with a sorbent (aluminum oxide); removal of hexane with weathering; measurement of the mass of the residue in the flask after the evaporation of hexane; calculation of the mass fraction of the oil product. Analysis of research results.

The results of experimental studies of the content of petroleum products in soil samples taken at the territory adjacent to the airport, depending on the distance to the runway, are presented in Fig. 1.

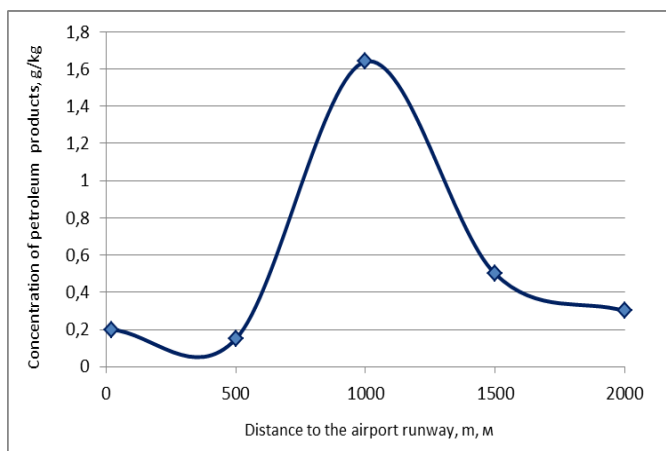


Fig. 1. Dependence of the content of petroleum products in the soil on the distance to the airport

Analyzing the obtained results of experimental studies of the content of petroleum products in the soil samples selected by us, we can conclude that for two soil samples, which were collected at a distance of 20 m and 500 m from the runway, the content of petroleum products is below the established approximate permissible concentration (APC) at the level of 0.2 g/kg [7].

For other samples, which were taken at distances of 1000, 1500 and 2000 m from the runway of the airport, an excess of the approximate permissible concentration of petroleum products in the soil was established.

The highest level of pollution is characterized with the soil sample taken at a distance of 1000 m from the runway, for which the content of oil products in the sample is 1.64 g/kg. The obtained results of experimental studies of the level of soil pollution in the territory adjacent to the airport indicate the need to develop a system for monitoring the ecological state of the soil in these territories using modern methods of monitoring the state of the environment.

In our opinion, biological methods for determining of the level of the soil phytotoxicity, which are affordable and effective for solving this type of problems, are perspective for solving this problem.

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