

## ASSESSMENT OF THE BUZKY ESTUARY ECOLOGICAL SITUATION BY THE BOTTOM SEDIMENTS POLLUTION DEGREE

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### *Summary*

*The results of the Bug estuary water ecological situation assessment on the indicators of bottom sediments pollution with heavy metals and oil products are presented*

**Key words:** estuary, pollution, heavy metals, oil products

### *Анотація*

*Представлено результати оцінки екологічного стану вод Бугського лиману за показниками забруднення донних відкладень важкими металами та нафтопродуктами*

**Ключові слова:** лиман, забруднення, важкі метали, нафтопродукти

### **Introduction**

The leading role in the formation of the chemical composition of water systems is played by bottom sediments formed as a result of sedimentation of water-suspended material and its interaction with the aqueous phase [1]. Bottom sediments accumulate substances coming from the catchment area, thus reflecting its geochemical features [2].

Especially relevant is the study of the degree of contamination of bottom sediments with chemicals, especially heavy metals and petroleum products. The entry of such substances of anthropogenic origin into the reservoir leads to the formation of so-called man-made sludges, in which technogenic geochemical associations are formed [3].

The purpose of work is research and an estimation of a condition of the Bug estuary in the territory of Mykolaiv-city on pollution of bottom deposits.

### **Research results**

Assessment of the Bug estuary bottom sediments toxic pollution was carried out based on the results of chemical analysis and calculation of the following indicators:

- hazard factor of controlled substances ( $K_0$ ), which characterizes the degree of exceeding the values of the maximum permissible concentration (MPC) of the substance;
- concentration factor of chemical elements ( $K_C$ ), which characterizes the degree of exceeding the values of the substance background concentrations;
- total pollution index ( $Z_c$ ), which reflects the complex effect of the elements group.

Assessment of the Bug estuary bottom sediments pollution situation was carried out in August 2020 - 2021. Sampling was carried out at three points near the location of the seaport near Mykolaiv. The content of heavy metals ( $Cd^{2+}$ ,  $Pb^{2+}$ ,  $Zn^{2+}$ ) and petroleum products was determined in the selected samples.

Determination of heavy metal content in solutions was performed by atomic absorption spectrophotometry. For quantitative analysis of oil and petroleum products in bottom sediments was used the method of IR spectrometry.

According to the results of chemical analysis in the selected samples at all control points was found to exceed the maximum concentration limit of petroleum products and zinc. At one point, located at a distance of 1000 m from the coastal strip, an excess of cadmium concentration was observed. Exceedances of background concentrations in the study area were detected for zinc and oil.

Lower sediments contain petroleum products that are 4 times higher than the MPC. Accordingly, the level of contamination and bottom sediments with petroleum products can be assessed as very strong.

The range of oil products is determined by the range and location of sampling. Distance from the coastal strip - 7.5 m (point № 1): this is the area of the port berth - the ship's berth. Point № 2 is located at a distance of 500 m from the shore, the concentration of petroleum products in this sample is the lowest of the three sampling samples. This is the distance of passage of ships, during this period from the ship possible leaks of petroleum products during the movement. The territory of point № 3 is raid, the ship is waiting its turn for loading and unloading.

Zinc pollution of the Bug estuary in the port occurs throughout the sampling area. The concentration of zinc is quite high and exceeds the MPC. Maximum zinc pollution is above the permissible norm - 4.6 times in 2020, and 1.8 times in 2021.

The concentration of lead in the bottom sediments is within normal limits and does not exceed the MPC.

### **Conclusions**

According to the results of the calculation of the of the Bug estuary bottom sediments total pollution, it was found that the content of toxic elements in the estuary water in the study area is slightly elevated relative to the background, and this area can be attributed to areas with moderate levels of pollution.

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