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Influence of phytoplankton of drawoffs upon formation of Chloroformium in drinking water

Purpose. Determine the role of the phytoplankton of the water intake of the Metropolitan Teteriv River in the formation of chloroform in drinking water in 2014 Methods. Qualitative and quantitative composition of phytoplankton in samples of water from the intake was determined by the method of hydrobiological analysis, the content of chloroform in drinking water - gas chromatographic method. Results The influence of dynamics of phytoplankton development in water intake on the fluctuations of chloroform content in drinking water has been analyzed. Conclusions Significant influence on the formation of chloroform in drinking water from aquatic invertebrates of plankton algae had only blue-green algae. Due to the excessive content of chloroform in drinking water for most of the year, it is necessary to take measures to prevent "blossom" and water purification.

Key words: "flowering" of water, blue-green algae, water treatment, drinking water, chloroform.

Over the past decades, the attitude towards the problem of halogen-containing compounds formed during chlorination of drinking water has changed markedly. Chloroform is a representative of the group of trihalomethanes (TGM) - typical and fairly common by-products of disinfection available in all water systems, where chlorine and chlorinated substances are used to disinfect drinking water [1, 2]. Chloroform is found in drinking water more often and in higher concentrations than other THMs and is considered as an indicator of the content of chlorination products [2, 8]. The formation of chloroform is facilitated by the presence in the reservoirs of drinking purposes of organic substances, the content of which is often due to the "flowering" of water through the active development of phytoplankton due to the introduction into the aquatic environment of nutrients. Among them, the most common are products of decay of fertilizers, detergents, some types of pesticides, etc. [2, 6, 11]. It has been established that chlorinated drinking water significantly increases the risk of cancer in humans and animals [3, 4, 7, 8]. The above determines the urgency of the problem of danger to humans and animals of contamination of drinking water with chloroform due to its decontamination and discoloration with liquid chlorine and chlorine substances. The purpose of the research is to determine the role of the phytoplankton in the water intake of the Metropolitan Tetere River in the formation of chloroform in drinking water in 2014 Materials and methods. The research was conducted according to generally accepted methods used by the Communal Enterprise "ZhytomyrVodokanal" [6]. The sampling of water (1 dm3) was carried out from the water intake of the Quaternary river of Teteriv and reservoirs of clean water (in winter - once a month, in other periods of the year - twice a month) [6]. Determination of the qualitative and quantitative composition of algae in the water intake The recess was carried out by the method of hydrobiological analysis. The main method of analysis was to concentrate phytoplankton on membrane filters and further calculate the amount of algae (cl. / Cm3) in the Nozhott chamber [6]. The concentration of chloroform was determined by the gas chromatographic method [5]. Sampling of water and determination of these indicators was carried out with the participation of employees of the water channel.

Results of research and discussion. At KP "ZhytomyrVodokanal" as a disinfectant and bleach water during its preparation for a long time used liquid chlorine. Starting in 2012, secondary chlorination began to be carried out with sodium hypochlorite, which is safer in use and cheaper than liquid chlorine. In addition, since then, due to the influence of climatic factors in the water intake, some disturbances in the dynamics of phytoplankton development began to occur. Perhaps these changes caused the extremely high content of chloroform in drinking water in August 2014 (about 2 mg / dm3) (figure). Moreover, the development of diatoms and green algae, in contrast to the earlier period, was minimal. I will become "blossom" only blue-green algae

(tsianobakterii). They had 2 almost identical peaks of development - in August and October, which was not before. The first peak of them corresponded to the highest content of chloroform in drinking water. Therefore, it becomes clear that from all available in the water intake of the planktonic algae departments, the most "contribution" to the formation of chloroform in the form of organic matter made it very blue. A similar tendency has been followed in the last 3 years.

Dynamics of phytoplankton development (cl / cm3) in water intake and fluctuations of chloroform concentration (mg / dm3-10-5) in drinking water during 2014: F - diatom; - ■ green; -A blue-green -X chloroform

Significant excess of MPC chloroform in drinking water in June and July was associated with the onset of the active development of blue-green algae and lasted (except for September) until October, and only in November and December the concentration of chloroform was normalized. The transition to water treatment technology using sodium hypochlorite has helped to reduce the process of water preparation and make it safer for employees, but did not provide a reduction in the content of chloroform in drinking water to the normative values. Since the excess of the maximum concentration of chloroform in drinking water at the Communal Enterprise "ZhytomyrVodokanal" has been observed for most of the year, measures should be taken to reduce it. For this purpose, it is expedient in the future to pay more attention to preventing the "flowering" of water with the use of blue-green algae and the use of sorption methods for the removal of chloroform [2, 6]. It is also quite effective to apply methods for reducing the content of substances from which chloroform may be formed. It is possible for use in the first stages of the preparation of drinking water of biofilters [9, 10], in which the use of microorganisms is oxidation of organic substances, which allows them to significantly reduce their content and, accordingly, reduce the concentration of chloroform in the drinking water.

Conclusions

Significant influence on the formation of chloroform in drinking water in 2014 was due to the presence of blue-green algae in the water intakes: the beginning of their active development in June coincided with a significant excess of MDC chloroform, and most of them in August corresponded to the maximum value of chloroform. Due to the excessive content of chloroform in drinking water at the water channel for most of the year, it is necessary to take measures to prevent the "flowering" of water in the presence of blue-green algae and to normalize the content of chloroform by way of water purification.

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