

ECOLOGICAL AND TECHNOLOGICAL PROBLEMS IN WATER COLLECTION FACILITIES

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Abstract. This material contains recommendations on various environmental and technological problems, hydrobiological analysis of water, sanitary-hygienic inspection of water sources and water supply systems in general.

Keywords: Water intake facilities, open water sources, algae, ecology, agriculture

ЭКОЛОГИЧЕСКИЕ И ТЕХНОЛОГИЧЕСКИЕ ПРОБЛЕМЫ В ВОДОСБОРНЫХ УСТРОЙСТВАХ

Аннотация. Этот материал содержит рекомендации по различным экологическим и технологическим проблемам, гидробиологическому анализу воды, санитарно-гигиеническому обследованию источников воды и систем водоснабжения в целом.

Ключевые слова: Водозаборные сооружения, открытые источники воды, водоросли, экология, сельское хозяйство.

INTRODUCTION

During the operation of water intake facilities, various ecological and technological: ice mixtures, algae (water bloom); biogrowths (dreissena, algae), problems arise.

Nutrients entering water sources as a result of human activities cause excessive development of phytoplankton - eutrophication. The development of algae up to a certain time has a positive effect and helps the process of self-cleaning in water bodies. But with an intensive flow of biogenic and organic substances into the water source, the concentration of algae reaches critical values with the beginning of a water "bloom" (Fig. 1), in which algae begin to pollute the water source itself[1]. Mass "blooming" of water deteriorates the organoleptic properties of water, increases turbidity, changes the chemical composition of water, negatively affects water purification systems (in particular, rapid filters), therefore, hydrobiological analysis of water is the most important element of sanitary-hygienic inspection of water sources and water supply systems in general is counted.

MATERIALS AND METHODS



Figure 1.

Reservoir water "blooming"

Algae clogs the surface of sand filters, creates biofoam, which shortens the filter cycle and increases the frequency of backwashing, increasing the rate of water flow in excess of the volume of treated water. During the "blooming" period of the reservoir, the time of the filtration cycle can be reduced to 5 hours, the number of washings increases to 30 times a day.

It should also be noted that when the algae die, they can become a substrate for the growth of bacteria, fungi and other organisms that enter the filter.

"Ice-sludge events in rivers still cause the most serious difficulties in the operation of water intake facilities, sometimes the water supply to consumers is completely stopped (Fig. 2). It has a negative effect on the water intake system in the northern and southern regions of our country. Due to this, in recent years, there have been major difficulties with interruptions in water supply at the water intake points of a number of cities.

This confirms that the complications of ice-sludge mixing are determined to a lesser extent by the geographical location of the catchment areas and to a greater extent by the natural-climatic characteristics of the area.

The issues of silt formation and the influence of silt on the operation of water intake structures have been studied very deeply, therefore, the theoretical aspects of the problem will not be considered here, and the main attention will be paid to natural factors and methods of protection of water intakes from ice-sludge pollution. The level of influence of mud does not remain constant, but changes from year to year and sometimes manifests itself unexpectedly. [2].



Figure 2.

Ice-sludge mixing phenomenon in rivers.

RESULTS

"Often, the negative impact of silt is considered to be the result of disturbance of the natural thermal regime of rivers. The negative impact of ice-sludge factors on the operation of water intake structures corresponds to the development of centralized water supply along its entire length.

From the point of view of use, it is important to anticipate the situation that may arise in water intake during the pre-freeze period and to take timely measures in certain ice-sludge

conditions.

Practice confirms that this applies only to small water bodies, but large reservoirs and lakes create more complex ice-sludge situations than in rivers, which can lead to complete closure of the water intake [2].

Waste, pressure and gravity, as well as intake windows with suction grilles, the type of pipes in the intakes (which should be emphasized in the regulated water source) are exposed to internal pollution by the inhabitants of the reservoirs, including a special type of mollusk dreissina is more noted.

Such pollution can be very important, which, accordingly, creates a sharp level of loss of water pressure in the suction systems of water intake systems and threatens the complete closure of water supply facilities. In water supply systems, the larvae of the Dreissina mollusk sometimes move autonomously, especially under the influence of liquid currents.

DISCUSSION

Therefore, in working water intakes, the collision with the Dreissina mollusk should be considered not only as a means of continuous water supply, but also as a means of saving energy" [3].



Figure 3 .

layer of dreissen on the inner walls of pipelines

A popular and effective means of controlling biofouling is pre-chlorination of water by injecting chlorine in front of water points. The calculation of the dose of chlorine is confirmed based on the type of hydrobiont most common in its biological habitat. As it was determined empirically, biogrowths in water intake facilities (Fig. 4) are destroyed at a residual concentration of chlorine in water up to 0.3 mg/l.



Figure 4 .

Dreissena contamination of water intake facilities

CONCLUSION

Hydrobiological analysis of water for various environmental and technological problems during the use of water intake facilities is one of the most important issues of sanitary-hygienic inspection of water sources and water supply systems in general. The complications of ice-sludge mixing should be selected depending less on the geographical location of water intakes and more on the natural-climatic characteristics of the area.

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