RECONSTRUCTION OF WATER CLEANING SYSTEMS IN A MODERN WAY

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Abstract: The main rules of the concept of reconstruction of water treatment systems in a modern way and its differences from the reconstruction of treatment facilities in a modern way are shown. Recently, during the reconstruction of water structures, more and more attention is paid to the environmental aspects of their operation, and such reconstruction cannot be carried out in practice without modern methods. In order to improve the performance of the facility, several water companies have upgraded the water facility with modern techniques. Reconstruction of water treatment facilities can reduce the iron content in drinking water and increase the productivity of facilities.

Key words: drinking water, turbidity, reconstruction, color, modern method, wastewater, aluminum salts, thin-layer clarifiers, fast filters.

Surface water sources are characterized by year-round variability of water composition and often the absence of permanent specific pollution (iron, manganese, etc.). Water purification from such water sources is carried out according to the standard scheme: cleaning by adding reagents, filtering. In this regard, treatment facilities are mainly designed to reduce the removal of retained solids and bacterial contamination. Groundwater sources that do not have a hydraulic connection with surface water sources, on the contrary, are characterized by a constant composition and a significant amount of specific pollutants.

The main task of any water treatment plant is to obtain drinking quality water. This implies a fundamental difference between the modernization of wastewater treatment facilities and the modernization of the water treatment process. In the first case, modernization is aimed at improving the quality of treated wastewater, which cannot be accepted for drinking water, because the legislation does not provide for the possibility of preparing drinking water of different quality. Re-technological re-engineering of water treatment facilities by changing the quality composition of drinking water is allowed only when the standards change (introduction of new indicators that require changing the treatment technology) or certain indicators (color, turbidity, iron, manganese, mineralization , hardness) is possible when exceeded. in drinking water in agreement with regional sanitary-epidemiological services. The use of modern technologies makes it possible to obtain drinking water from almost any water source, even those previously considered unsuitable for these purposes. If the list of regulated pollutants changes,

existing facilities for other uses may become unusable and require new design and construction.[1]

The second difference between the modernization of wastewater treatment facilities and the modernization of the drinking water preparation process is related to the environmental impact of treated water. In the first case, the target product (purified wastewater) has a direct impact on the state of water intake, therefore, the process of purification using modern technologies is directly related to the tasks of nature protection. In the second case, the target product (drinking water) does not directly affect the water source, therefore modern technologies are the main process of environmental protection by products (sediment and filter washing water etc.) should affect the quality.

Recently, in the reconstruction of water structures, more and more attention is paid to the ecological aspects of their activity, and such reconstruction cannot be carried out without modern technologies.

However, it is not always possible to clearly distinguish between simple reconstruction and reconstruction with modern technology in water treatment. As an example, consider several water structures. One of the most challenging tasks of water treatment and sludge treatment is the treatment of natural waters with low turbidity and color. It is this water that is produced in the water treatment facilities in the city of Kuvasoi, Fergana region.[2]

Classical water treatment technology is used in water supply facilities: chlorination, coagulation, sedimentation and filtration in rapid filters. Coagulation is carried out with purified aluminum sulfate. Soda water is used for alkalization. The purification technology does not ensure a sufficiently stable quality of drinking water, as organic substances increase in source water from time to time. Attempts to increase the dose of coagulant (aluminum sulfate) do not give the desired effect, on the contrary, the concentration of residual aluminum in water increases. This situation caused the need to develop a more effective technology that meets modern requirements based on the characteristics of natural water composition - modernization of production.

Initially, the drainage distribution systems of all rapid filters with a total design capacity of 24,000 m3 per day were reconstructed by "Water Supply" organizations. Polyethylene pipes were previously used as drains in filters. In the process of using this type of drainage, there were problems with the particles of the filter load clogging in the holes, which led to an increase in the hydraulic resistance of the drainage pipes. Therefore, the washing intensity was different in different filters, an increase in filter material was noted, and it was necessary to periodically remove the load completely and clean the grooved drain.

Replacing these pipes with ecopolymer drains will stabilize the operation of the filter, increase the level of cleaning for suspended solids (turbidity) and partial aluminum and organic substances, as well as reduce the amount of research needed in this regard, improve the quality of reactive water treatment made it possible. It should be noted that only the reconstruction of drainage distribution systems of all rapid filters in any water treatment plant allows us to fully reveal the effectiveness

of Ecopolymer drainage distribution networks. At the same time, only their reconstruction does not solve all the problems of water purification, because in this case, rapid filters are a pledge of the initial technological stages.[3]

During 2020-2023, studies on Ecopolymer water purification methods are being conducted in the city of Kuvasoy to solve the problem of stabilizing the quality of drinking water. At the first stage, laboratory research is being conducted in real waters and under conditions of use of treatment facilities at different times of the year. Researches are conducted in the method of multifactorial planning of experiments.

Several technologies for treating such waters have been studied, but the best results have been obtained by adding the sediments to the source water as a "flocculating agent" after blowing the clarifiers and washing the filters (process discharge). It is statistically reliably determined that the introduction of such an additive and flocculant increases the efficiency of water treatment, which can be seen not only from the analysis results, but also from the rate of sedimentation and the rate of water treatment.

In order to obtain the most reliable information for design, experimental tests are conducted under adverse conditions on the quality of water supplied to the treatment plant. At the same time, with the addition of a flocculant and a clarifying agent, the current rules for the introduction of basic reagents are observed. During the industrial experiment, the results of laboratory studies were confirmed, the doses of various reagents and their injection points were determined.

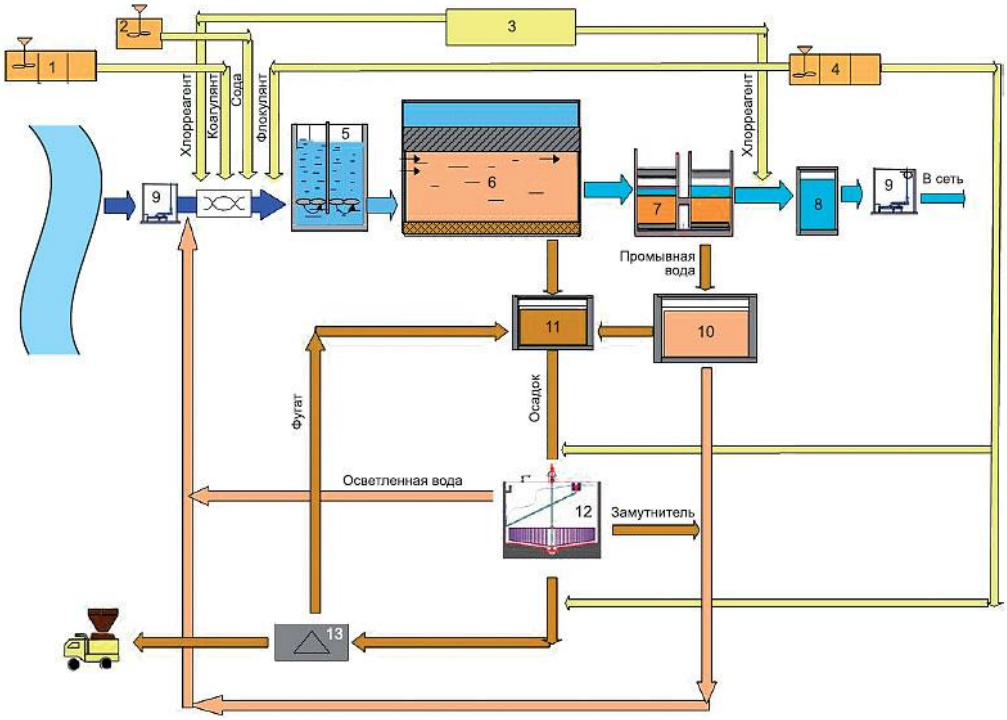
Currently, technological unloading is being carried out in the storage lake. Since the flow is a complex multi-component system containing mixtures obtained from natural water (sand, clay particles, humus, microalgae), coagulant hydrolysis products - aluminum salts, as well as organic flocculants, this technical solution meets modern environmental requirements. does not give In this regard, it is decided to clean the technological waste, dewater the separated sludge and dispose of it.

In water facilities, wastewater is formed very unevenly, so sludge treatment facilities must have equalizers. Flow averaging should be carried out not only by volume, but also by composition, and facilities should be modernized, for example, sediment collection systems in settling tanks, water washing of rapid filters, air and water replace with; schedules of filter washing and precipitator blowing are adjusted.

Based on the results of the research, a technological scheme will be developed at the "Ekopolimer" enterprise, the dosages of reagents and the technological parameters of water purification will be determined, and the equipment will be selected that allows dosing of reagent solutions in automatic mode.[4]

Taking into account the above, a project for the reconstruction of water facilities was developed. The main stages of the reconstruction are: the construction of a sludge dewatering plant and the modernization of the natural water treatment system. The technological scheme of cleaning (picture) includes

all previously used objects and additional units: washing water collection and averaging; sediment thickening; clay processing; preparation and dosing of reagents, as well as cleaning of sediments in purified water to improve the coagulation process. The developed technology reduces the concentration of humic substances (according to the oxidation capacity of permanganate) from 5 mg / l, suspended solids from 1 mg / l, the concentration of aluminum in purified water from 0.5 mg / l (on average 0.2 mg / l) provides a reduction. l), color PCS below 20 degrees, that is, quality indicators that meet modern standards are provided. In addition, the implementation of this project in the city of Kuvasoy will prevent the discharge of more than 3.5 million m3 of production waste into the reservoir with an average aluminum content of 30 mg / l per year .



Flow chart of natural water treatment and sludge dewatering in a water treatment plant

1-coagulant preparation station, 2- tank for soda solution, 3- chlorine farm, 4-flocculant preparation station, 5- grain chamber, 6- softener, 7- filter, 8- clean water tank, 9- pumping station, 10- washing water tank, 11- sludge collection tank, 12-boiler, 13-centrifuge

In addition to the use of flocculants for the treatment of highly colored waters, the proposed technology involves the separation and dewatering of sludge from the water treatment process, as well as the return of washing water from filters and sedimentation. The latter solution not only increases the efficiency of water treatment, but also ensures a drain-free process.[5]

Modernization of water treatment is also necessary to increase the productivity of water facilities, because with properly designed facilities, it is not possible to increase productivity without losing the quality of drinking water. Thus, in contrast to wastewater treatment technology, improving the efficiency of existing water facilities (without new construction) is related to modern technologies. At the same time, the growth of settlements, the development of urban infrastructure and the increase in the relative consumption of water lead to the fact that the design capacity of water supply facilities does not cover the needs of the population served.

Such a situation occurs in many regions, in order to increase the productivity of existing facilities, it is necessary to implement water facilities using modern technologies. The study of facilities and subsequent modeling of the system showed that productivity can be increased by simultaneously reconstructing a complex of facilities: (mixer, suspended sludge clarifiers and rapid filters). Work should be carried out in the conditions of a working station without reducing productivity.

On the basis of the task, technical documents will be developed, the main element of which will be the reconstruction of the distribution and water collection systems, as well as equipping the clarifiers with thin-layer sedimentation modules. Long-term tests of thin-layer constructions confirmed the high efficiency of the suspension deposition method in small-height layers, as well as the strength, reliability and durability of the developed block construction, ease of installation and use.

At the same time, the experience of using these stations has shown that the efficiency of thin-layer clarifiers, as well as conventional ones, depends on the quality of preparation of flocculent suspension. An important role is played by the uniformity of water collection and distribution throughout the clarifier area, as well as the uniformity of sediment removal in thin-layer elements and its conversion to a sludge thickener.

Thus, an integrated approach is needed to solve all technological problems related to flocculation, sedimentation, suspension removal, as well as hydraulic operation of sedimentation facilities. The use of thin-layer sedimentation technology improves the quality of water treatment: the content of suspended particles decreases by an average of 5-10 times, and organic matter decreases to standard values when the coagulation process is adjusted. The distribution system and sludge removal pipes have been replaced, and the clarified water drainage system will be upgraded.

Based on these recommendations, design and project documents are developed, thin-layer modules and drainage filters are manufactured and delivered, assembly work is monitored and commissioned, including the selection of dosage and reagent injection mode. As a result of modern technology, it will be possible to increase the productivity of water treatment facilities by 30% without losing the quality of drinking water. Modernization of the distribution and collection systems allows not only to increase the performance of the suspended sludge clarifier, but

also to stabilize the suspended sludge layer to a greater extent, which leads to stabilization of the structure.

The project of reconstruction of water treatment facilities envisages the replacement of the drainage distribution system, filter material, filter washing equipment, installation of equipment to automatically maintain the filtration rate. First of all, reconstruction of fast filters was carried out. Instead of perforated steel pipes, an "Ecopolymer" drainage and distribution system for washing water and air will be installed, and the filter material will be replaced. The amount of iron in drinking water used to be 0.44-0.95 mg/l, and after the reconstruction stage it will decrease to 0.16-0.18 mg/l. The implementation of project solutions also allows to improve the performance of water treatment facilities.[6]

The above examples show that - management of the process of reconstruction and modernization of natural water treatment facilities ensures reduction of environmental impact.

Conclusion

Filter materials have been improved in the water treatment process. The project of reconstruction of water treatment facilities provided for the replacement of the distribution system, filter material, filter washing equipment, and installation of equipment to automatically maintain the filtration rate.

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