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USE OF FREEN WATERS IN CONDITIONS OF GEOECOLOGICAL DIFFICULTIES IN THE FLOWER OF THE AMUDARYA RIVER

Abstract: Due to the worsening geo-ecological situation in the lower reaches of the Amudarya River, there is a problem in providing high-quality drinking water to remote settlements from the Tuyamuyun water pipeline. In recent years, due to the deterioration of surface water quality and the negative impacts of water scarcity and hydro-reclamation works, a deterioration in the quality and depletion of freshwater reserves along the riverbanks has been observed, especially at intensively exploited deposits.

Keywords: river, Amu Darya, Tuyamuyun, water conduit, desalination of underground waters.

Introduction

In the complex of these measures, the introduction of methods for the artificial formation and replenishment of freshwater beds, especially in the areas of existing water intakes, can play a positive role. Artificial replenishment can be most successfully applied in areas where there is a continuous or short-term (up to 2-3 months per year) flow of fresh water in watercourses, while artificial formation of fresh water can be applied in areas where fresh water flow is observed only during the harvesting period. However, the scientific and methodological foundations for the artificial formation and replenishment of freshwater bed lenses are poorly developed. This work attempts to fill this gap.

1.5 гIn these conditions, fresh and slightly salty groundwater is used to meet the needs of the population. In this regard, the need arises to study the process of groundwater formation and desalination in greater detail and depth. In our view, research work in the field of studying the desalination of saline groundwater is

timely, as it can provide additional sources of high-quality drinking water in the region. To meet the water needs of remote settlements, underground and surface water from wells is used, often of poor quality. In the lower reaches of the Amu Darya River, previously explored and exploited fresh groundwater cannot be exploited without additional measures to desalinate saline waters, as the groundwater pumped out at this time is in many cases of poor quality in terms of mineralization, hardness, sulfates, and other components. To carry out work using the method of artificial replenishment of groundwater reserves, the forecasted groundwater reserves with mineralization up to 3 g/l are 5621 thousand $^{m3/day.}$ Of these, the approved deposits for 39 A+B+C1+C2 categories amount to 554 thousand $^{m3/day}$ with a mineralization of 290 thousand $^{m3/day.}$ The total groundwater withdrawal is currently 74.5 thousand $^{m3/day.}$ (3)

Main part

Research results have shown that the desalination and treatment of saline groundwater by artificially replenishing groundwater reserves, as well as using accessible and inexpensive local mineral adsorbents on-site, is one of the real approaches to solving the problem. In recent years, artificial replenishment of groundwater reserves has been carried out at existing water intakes (Akmangit, Kegeyli, etc.) that utilize groundwater to preserve and increase operational reserves.

38 мApplicable to the conditions of the lower reaches of the Amu Darya River, the principles and norms for exploiting desalinated saline groundwater using the method of artificial replenishment of groundwater reserves (under various conditions of their occurrence (15m –), depending on the water-bearing rocks, have been established. The calculation of water intakes using computers and the selection of optimal operating modes based on mathematical models under freshwater lens conditions included forecasting the decrease in dynamic levels in operational wells, the duration of saltwater uplift and its replacement with freshwater, and the optimal placement sizes of water intake elements. Under conditions of artificial replenishment of groundwater reserves, natural self-

purification of groundwater (bioactive layer) was carried out, and water withdrawal increased to 1.5-2.5 times due to the accumulation of fresh groundwater volume during the pumping out of saline groundwater. As a result, the artificially created desalinated water volume is sufficient for water supply during the intermediate period without deteriorating groundwater quality until the start of the next stage of the filtration cycle. The operating principle of a water intake with an IVZPV can be seen in the example of the Kuvanishjarma field, where wells of two thicknesses operated during the flood period (120 days). During the dry period (183 days), characterized by the absence of water in the canal and contours, only the lower stage of the wells in the boundless formation operated for 62 days (31 days before the start of underground water storage work and the same amount after its completion), utilizing artificially formed freshwater reserves.

1 м^{3}Applying the established patterns to fresh groundwater deposits will further reduce the volume of geological exploration work. The cost-effectiveness of the method is expressed in conducting short-term research within a single experimental block. Obtaining maximum information about the dynamics of diverse processes occurring in a groundwater deposit during various operating modes during a full annual water intake cycle, without conducting new expensive research, yields significant economic efficiency. This achieves the compactness of water intake structures and high-performance operation of installed capacities, resulting in electricity savings and a 20-25% reduction in the cost of pumped water. In this regard, the research results, in our opinion, are of significant interest for their use in assessing groundwater lens reserves, and most importantly, during the full annual cycle of water intake work with artificial replenishment of groundwater reserves, we obtain maximum information about the dynamics of various processes occurring at the deposit (canal lenses) under various operating modes.

Conclusion

To effectively utilize fresh groundwater in the lower reaches of the Amu Darya River, it seems necessary to:

- during the presence of fresh surface water in the canal, fill the feeding contours. Strictly monitor the flow rate, level, and quality of groundwater withdrawn by water intake wells;

- construction of main and auxiliary feeding circuits. This will reduce colmatation processes and provide the opportunity to manage the storage and desalination of groundwater reserves.

In order to monitor seasonal changes in the quantitative and qualitative state of underground and surface waters, as well as the conditions for forming operational reserves of water intakes using the method of artificial replenishment of underground water reserves, it is necessary to conduct area-based year-round regime observations. Based on the results of observations, to achieve effective operation, it is necessary to annually clean the bottom and edges of the supply circuits before filling them with water and to create a sanitary protection zone for water intakes.

In geographical terms, along the Doslyk, Kegeyli, and Kuvanishjarma canals, similar types of deposits have been identified, and there are prerequisites for identifying similar lenses in the developmental areas of other ancient riverbeds. In this regard, the research conducted by us is of both scientific and practical interest for further work on the method of artificial replenishment of fresh groundwater reserves in relation to other territories of the region.

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