Current problems of water intake from Amudarya without rest and measures to improve them

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Abstract. In this article, the Karakum canal, which receives water from the middle part of the Amudarya, the anterior trunk canal, the problems in the areas of dam-free water intake into the Amu-Bukhara machine channels: that is, the processes in the river basin, the washing of the shores, the flow movements were studied in field and laboratory conditions. On the basis of the results obtained, recommendations were developed for the areas of water intake without rest.

1 Introduction

In the middle part of the amudarya are mainly located water intake facilities without large dams. These are the Karakum canal, which is located above the reverse to the 30 km flow direction, aging from the Kerki Kidroposti of the Amudarya-S.Karagum River named after Niyozov, main water intake structure to opposite main channel, located above the reverse direction of the flow 18 km from Kerki Gidroposti to the aging 250 km from Kerki Gidroposti is the main facilities of the water intake into the Amu Buxoro machine Channel, located below the flow direction [1–6].

The process of precipitation accelerates the process of turbidity in the river basin and in the canal, the reservoir located in the Canal Basin causes a sharp decrease in the volume of useful work. In addition, every year from Amudarya to the channel itself is about 100 million rubles.tons of hanging and moving Nanos from the depths of the Ozen come in and make the conditions of exploitation of the channel difficult. Over the last half century, as a result of this process, a large number of small tributaries are poured into the Karakum canal and have a surface of 150 km^2, totaling 350 million tons.it was observed that the lake of Kelif tinting with m^3 volume was muddy. In the latter periods, it was observed that 3–4 marotaba from the amount of account Nanos entered the water intake facility without this dam, many Nanos entered. As a result of a sharp change in the flow dynamics in the area of the dam-free water intake facility into the Karakum, Karshi highway and the Amu-Buxoro machine channel of the AMU-Buxoro highway, there are persistent cases that complicate the conditions of its operation in the canal [7–12].

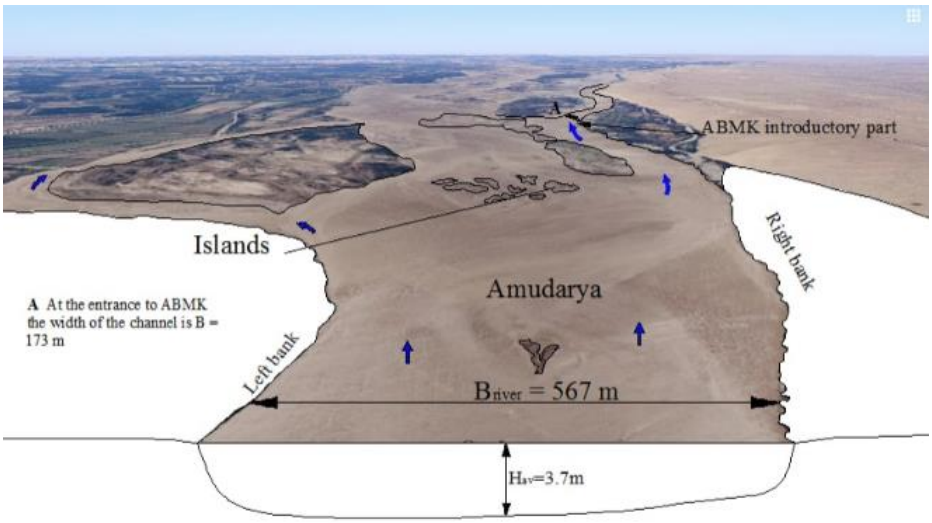

Fig. 1. A dam-free water intake area from the amudarya to the ABK canal.

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2 Materials and Methods

The head without Amudaryogan is directly with great difficulty, the great slope of its channel bottom, the process of elevation and the easy erosion of sediments (represented by fine sandy loam soils), extremely complex intensive load and affected placed without deep deformation.

To solve this problem, it is recommended to use physical-experimental modeling, which can give an accurate prediction of Channel deformation in the catchment area without a dam on the head structure. It should be noted that although experimental modeling requires a lot of material costs and a lot of research time, it is more acceptable than numerical studies. Therefore, we have conducted experimental studies in the field of water intake from Amudarya to ABMK without dams, and to reduce and prevent the inflow of sediments into the canal, as well as to ensure water intake during low water periods [13–15].

3 Results and Discussion

The development of a pioneer trench should be carried out at a time when there is little water (September–April), that is, at a time when the channel is least silenced with deposition. The length, width and depth of the pioneer ditch should be determined depending on the location of the intake channels, the point of intake of the river without a dam and the low water period of the river [16].

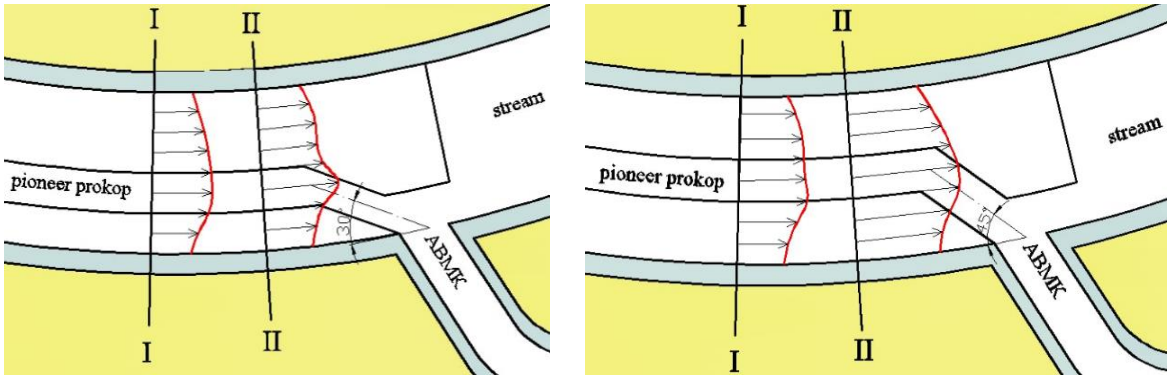

Fig. 2. Experimental research on the development of Prokop.

When conducting experimental studies, the curve of gravity parameters of the flow in the right direction does not choose the number of stvors 3, taking into account the complexity of the dynamics of motion of the flow in the opposite direction. In the initial case, the flow motion was studied on the basis of hydrodynamic equations. For blurry speed S. A.Grishkin formula [17–18].

$$\upsilon = A_1 Q^{0.2} \quad (1)$$

here A_1 – digital coefficient. It is the average weight size of the whitefish $\overline{W}$ connected, in this case, it is possible to use the same method.

E.A. Zamarin recommended the following as a formula for the ability to flow, based on the analysis of data from research in the Central Asia, the Caucasus and other areas:

$$\rho = 0{,}022\left(\frac{\upsilon}{\overline{W}}\right)^{3/2}\sqrt{RI} \quad (2)$$

Here I mean acceleration, m / sec;

The Formula is given for $0.022 \le W \le 0.008$ m/sec.

For shredded Cranberries

$$\rho = 11\upsilon\sqrt{\frac{RI\upsilon}{\overline{W}}} \quad (3)$$

At $0.022 \le W \le 0.008$ m/sec N. Gostunsky formula can also be used

$$\rho = 3300\frac{H^{0.5}I^{1.5}}{\overline{W}} \quad (4)$$

Amudarya channels for A. G.Hachatryan recommended formula

$$\rho_{kr} = 0.69\frac{\upsilon^{3/2}}{(R\overline{W})^{1/3}} \quad (5)$$

here ρ_{kr} – the highest turbidity, kg/m^3; R – the slope of the stream, m.

The mobility of the particles falling into the tube is determined by the approximate formula of the lowest speed of the current at which it stops:

$$\upsilon_0 = 0{,}3R^{1/4} \quad (6)$$

E.M. Minsk laboratory experiments, the speed of movement of Sandy grates W_j is determined from the following fastness:

$$W_j = 0.22(u - 0.25)^{9/4} \quad (7)$$

V.F. Pushkaryov recommends the following formula, based on laboratory experiments developed using dimensionless dimensions, in order to determine the speed of the movement of Sandy grates:

$$\frac{W_j}{u} = 0{,}019\frac{u^2}{gH} - 0{,}029\frac{gD}{u^2} \quad (8)$$

here u – flow rate; H – depth, m; D – average diameter of sand, m.

Calculation of the number of Reynolds was noted above

$$Re = \frac{\upsilon h}{\nu} \quad (9)$$

Calculation of average speed using logarithmic expression:

$$\upsilon = 4\lg\frac{6.15h}{\Delta}\sqrt{2ghi} \quad (10)$$

Maximum speed calculation:

$$U = \upsilon\lg\frac{16.7h}{\Delta}/\lg\frac{6.15h}{\Delta} \quad (11)$$

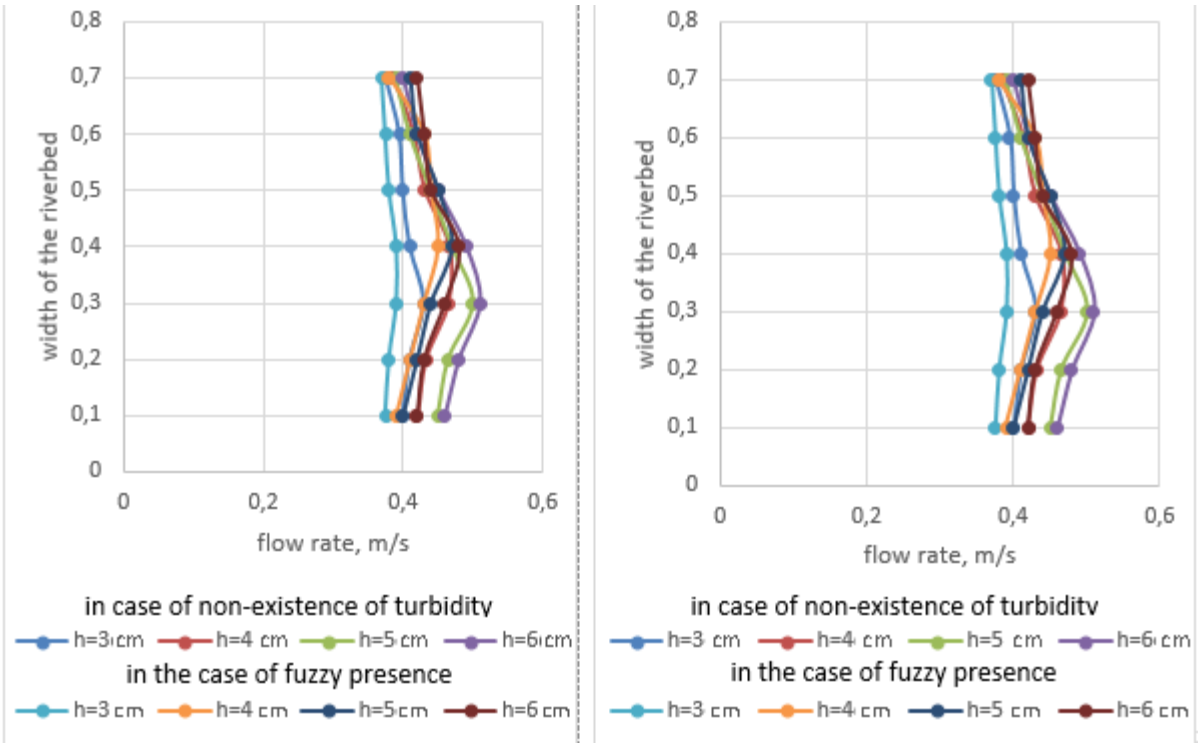

Fig. 3. The speed of the current in the 1 and 2 stvor in the presence and non-presence of turbid discharges.

According to an experimental study, the direction of the ditch should be planned from the point of view of the angle of its head no more than 300 degrees, proceeding from the location of the ditch in the right part of the river [19–23].

4 Conclusion

1. In the middle part of the Amudarya, since the beginning of the exploitation process of hydrotechnical facilities, the flow axis has changed, and the main fairway is always on the left bank. In periods of low water, the Amudarya river flows mainly through one channel in this area. In the riverbed, the deformations in terms of depth and width are rapid.

2. The analysis of the research carried out in the middle course of the Amudarya shows that the speed of the coastal washing current was observed up to 2 m/h, and the washing cycle was 10-60 m, and the depth was 5–10 m.

3. Ensuring high-quality water intake and water supply, characterized by the minimum ingress of river bed sediments into the river bed, can be achieved by introducing simple and effective anti-sediment elements, such as lower circulation barriers, into the water intake scheme.

4. As a result of theoretical and experimental studies, the width of the bottom, which allows to reduce the flow of muddy sediments by 20% into the channel directing the flow from Amudarya to ABMK, is B = 50 m, length L = 300 m and 750 m, depth H = 5 m The pioneer developed the structural elements of the trench [24].

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