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ANALYSIS OF THE IMPACT OF ABRASIVE TURBID WATERS ON THE INTERNAL PARTS OF PUMPING UNITS DUE TO TURBIDITY OF THE WATER IN THE AMUDARYA RIVER

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Abstract:
Rapid wear of water pump parts, dimensional change of parts, expansion of cracks are mainly caused by solid particles contained in the transported water. Their impact on parts (especially on the surface of the body) on parts (especially on the surface of the body) is enhanced in the process of "cavitation", and the impact of abrasive particles on the part increases even more.

Keywords: Pump stations, polishing, cavitation, repair.

The article provides information about the wear of the impeller as a result of the operation of the pumping unit and the increase in the diameter of wear of this impeller over time. These data show that the level of turbidity of the Amudarya water, which is considered the main water source of our republic, is several times higher than the permissible mechanical impurities for pumping devices.

There are 4.3 million irrigated areas in the Republic of Uzbekistan. About 1700 pumping stations and devices provide water for 53% of the cultivated area. In addition, more than 8,047 small pumping stations and devices have been connected to another 25% of agricultural land, where water user associations and farms operate.

The main water sources of our republic are the Amudarya and Syrdarya. These large rivers are transboundary and supply the countries of Central Asia with water.

The Amu Darya is the most abundant river, its flow is 2/3 of all water resources of the Aral Sea basin. The length of the Amu Darya from Pyanj to the Aral Sea is 2,540 kilometers, of which more than 1,000 kilometers pass through the territory of Uzbekistan.

The basin occupies a large area (about 1327 thousand square kilometers). The Pyanj River is called the Amu Darya after its confluence with the Vakhsh River. The flowing waters of the rivers carry suspended turbidity mixed with water and mobile turbidity at the bottom of the river bed. The Amudarya is one of the rivers fed by ice and snow, its water resources average 68.63 km3.

The main volume of runoff (85%) falls on the tributaries of the Vakhsh and Pyanj, and 15% falls on the share of the Surkhandarya, Kafornikhan and Kunduz rivers[1].

Water collects The total runoff of surface water from the Russian territory exceeds 80.5 cubic kilometers.

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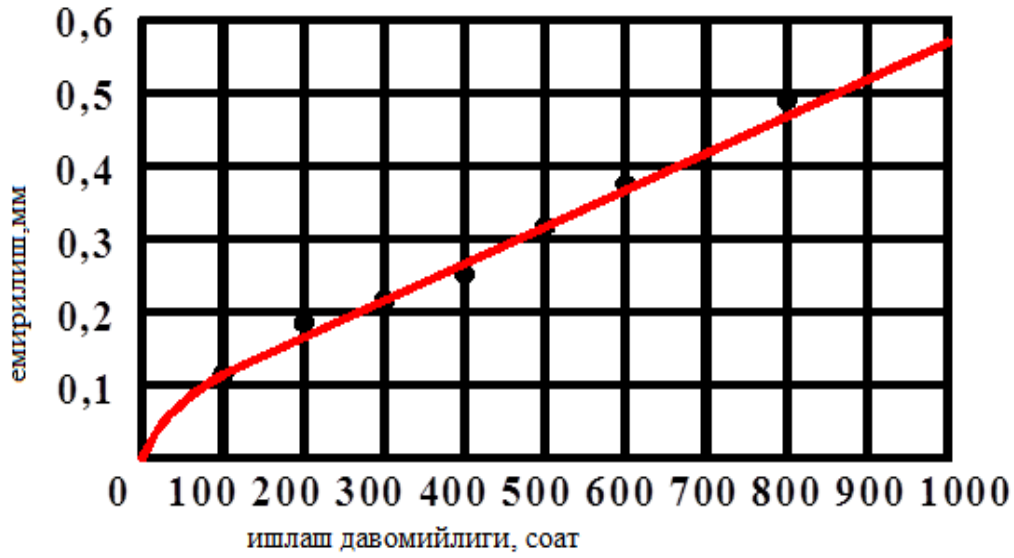
Table 1 Consider the weight of the pump impeller

Pump brand	water consumption, m3/s	pressure, m	Impeller diameter, mm	Number of revolutions, rpm
D 6300-27	6300	27 17	740 740	730, 585
D 5000-32	5000	32	700	730
D 4000-95	4000 3200	95 50	850 825	980 730
D 3200-75	3200 2500	75 42	755 755	980 730
D 2500-62	2500 2000	62 34	700 700	980 730

The amount of abrasive sand mixed with water flowing through the pumping stations used in our country is very large. Sand flowing through pumping stations corrodes the working parts of pumping devices and renders them unusable. In particular, abrasive wear of the pump impeller occurs in many cases. What we discussed above is possible for pumping devicesmechanical connections, which are several times larger than the allowable. Due to abrasive wear and cavitation of the pump impeller, this leads to a decrease in its FIC, which increases the excessive consumption of electricity in pumping stations, which leads to an increase in consumption..

The pump impeller wear curve is parabolic for the first 100 hours, after wear of the impeller surface, wear due to repeated exposure to abrasive sand on the worn areas of the wear wheel accelerates compared to the initial wear, and the graph becomes a straight line.



Graph 1. Pump impeller wear graph

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As a result of 100 hours of operation of the pumping unit, the impeller wears out by 0.12 mm, wear in subsequent hours is faster than in the first, and when the operating time of the pumping unit reaches 1000 hours, the worn out outer diameter of the impeller reaches 0.58-0.6 mm. [2]

The duration of the irrigation season is 6 months, and during this period the operating time of pumping stations is 4320 hours. The reduction in the diameter of the impeller is close to 2.5-3 mm. As a result, the water supply of the impeller is reduced, as a result, the water flow rate (Q) and the height of the water rise (H) of the pumping device are reduced several times compared to the initial state. Abrasive sands corrode not only the diameter of the impeller, but also its thickness.

a B C)

Figure 1. Pump impellers.

a), b) - damaged condition of the impeller, c) repaired condition of the impeller

Summary: The degree of turbidity of the water of each source is different, and this is becoming one of the main and urgent problems of our time. Turbidity mixed with river water, not mixing with water at the bottom of the rivers, together with water causes erosion of the working bodies of pumping stations and devices, reducing F.I.K. As a result, the consumption of electricity by pumping stations and devices increases.

The above situations are caused by the passage of abrasive sands in excess of the allowable amount through pumping stations. To prevent such situations, it is necessary to clean the water softeners in the pumping station in time.

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