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Remodeling Akkurgan Waterworks

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Abstract: *The article , based on the result s feasibility comparison considered two reconstruction options , serves economically advantageous variant reconstruction Okkurgan hydro with auto they adjusting it level and flow of water hydroelectric facilities , comprising rearrangements e shield part of the dam , the equipment and its openings and additional spillway structures with automatic gates of the level of the headwater of hydraulic action , and the openings of water intake structures in the Okkurgan and Khoja Balyand canals - with stabilizers of water flow.*

Keyword: Okkurgan, Akhangaran, hydroelectric complex, Almalyk, Hodge - Balyand

I.Introduction.

Akkurgan hydroelectric complex was built in 1973 on the Akhangaran river in the form of a low-pressure dam water intake hydroelectric complex . The hydroelectric complex is located in the floodplain of the river 48 km below the Akhangaran reservoir on the way to the city of Akhangaran and is intended for water intake into the left-bank canal, the right-bank Khoja-Balyand canal and for technical water supply to the enterprises of the Almalyk-Akhangaran complex. The structure of the hydroelectric complex includes: inlet and outlet channel; - concrete shield dam; - regulators of the left-bank and right-bank channels.

The actual throughput of structures waterworks is 530 m^3/s.

The supply channel is curvilinear in plan, the width in the narrowed place is -66 m, the length is -350 m. The jet-guide dams are 10 m wide at the top, the inner slope is lined with reinforced concrete.

The concrete dam, rectilinear in plan, is a continuation of the right-bank stream-directing dam and consists of two parts - a blind spillway and a shield dam. The spillway part of the vacuum-profile dam has a drainage front width of 80 m and consists of four holes separated from each other by 1.0-m-thick gobies. The shield part of the dam consists of two spans 6 m wide each, covered by flat gates.

Water intake into the canals is carried out by a regulator located on the left bank behind the shield spans.

The layout of the existing hydroelectric complex does not correspond to any engineering type of water intakes.

The supply channel, one of the most important components of the hydroelectric complex, does not fit into the Fergana type of water intake, does not correspond to the frontal type, and is essentially a sedimentation tank for sediments.

II.Discussion.

Existing two shield openings not perform the function of washing holes, so instead sediment discharge into river fall into the channels, especiallyand I siphon channel Khoja Balyand which transport water to the right bank to the Hodge-Balyand channel. Its throughput capacity decreased to 7 m^3/s, instead of the 12 m^3/s envisaged by the project .

Due to the fact that the flood plain Akhangaran river upstream thickly covered with the trees and shrubs in 1987, with the passage of flood Q = 620 m^3/s formed backwater before constructions waterworks, in which there was an overflow through the left dam and its breakthrough in the two- x places. The territory of water wells supplying drinking water to the city of Almalyk, as well as the arable land of the adjacent collective farm, was flooded.

In May 1992, an overflow occurred again through the dam during the passage of a flood with a flow rate of 570 m^3/s.

During the period from 1979 to 1992, the operational activities and repairs of waterworks was spent 1,450,650 rubles (according to the UMMC p. Sharh).

In 1988, the Institute drew up a working project for the repair and restoration of the existing hydroelectric complex, to prevent emergencies in the downstream.

The cost of construction and installation work amounted to 613.96 thousand rubles.

The work was performed poorly, with a pile of bentonites to the right dam, which again led in 1991 and 1992. to the underwater washout in the area behind the shield openings, therefore additional costs for the hydroelectric complex were required for repair work to ensure the normal operation of the hydroelectric station.

In 1988, on the instructions approved by the Minister of Land Reclamation and Water Management of the republic, the Institute carried out the project “Reconstruction of the water intake system on the river. Akhangaran for water intake into the Sharkhiya and Khodzha-Balyand canals ", which included two options:

1. Design of a new hydroelectric complex for a flow rate of $Q_{0.5\%} = 885\ m^3/s$ in two versions;
2. The design of the feed regulator for the flow rate Q = 330 m^3/s with the reconstruction of the existing hydroelectric complex for the flow rate Q = 550 m^3/s.

The Institute substantiated and recommended for construction a version of the new Fergana-type hydroelectric complex, the cost of which in 1984 prices is 4148.71 thousand rubles.

The expertise rejected the option proposed by the Institute and spoke in favor of the preservation and use of the existing hydroelectric complex.

According to the letter Mi Ministries waters Foot households Republic of Uzbekistan dated 14.03.1991 was about was charged with drafting the reconstruction project Dam on a competitive basis.

The project was based on the idea of using the existing hydroelectric complex and building a new additional relief regulator.

The capacity of existing hydroelectric 530 m^3/s, an additional 330 m^3/s, the composition wish to set up the sum $Q_{0.5\%} = 860\ m^3/s$. The variant was worked out with model studies carried out in the hydraulic laboratory of the Institute , according to this variant in 1994-1995 the existing hydroelectric complex was reconstructed.

The purpose of this reconstruction was to restore the right and partly to the left stream-guide dams destroyed by the flood and to increase the capacity of the hydroelectric complex . Reconstruction in the direction toward the upper mu tail water in from the water intake hydro , on the right bank of the river Akhangaran , separate spillway has been constructed , combined with water by the receiver in channel Hodge - Balyand , having a flow rate of 12 m^3/s . In this old first water inlet to the channel Hodge - Balyand , execution first as a siphon, extending through the foundation spillway of a dam on the right bank to the input second part w, located hydrochloric through the front spillway dam with the lion as , it was closed by plugging a pipe siphon to muffled cork , but not destroyed.

III.Conclusion.

Thus, the design construction applications minutes and mechanical equipment waterworks have not changed and are not reconstructed . Today, the structures of the hydroelectric complex are equipped with gates installed back in 1973 . E ti valves are badly damaged, edging them has dents, holes, rust, in the closed state through the gates there is a constant water leakage. The control of the gates is mainly carried out manually, due to the frequent lack of electricity, the gates are not automated, therefore, the water supply to the Sharhia and Khoja - Balyand canals is carried out with a regulation error of $\pm$20 ... 30%, which does not meet modern requirements for water supply and water saving . The old , non-working water intake to the Khoja- Balyand canal , remaining in the front of the spillway dam, narrows the front of the spillway dam, worsening the hydraulic conditions of the waterworks operation. Water receiver in channel has damage stilling parts and aprons, besides large damaged Ia has stilling apron portion and the shield portion of the dam, which indicates the high specific consumption of water , periodically in the downstream spillway dam . It follows that since the construction waterworks work over e 40 years, they are worn and obsolete , require reconstruction.

We offer two options for reconstruction:

1 st embodiment - destruction (eradication) of the old broken water inlet portion of the receiver in channel Hodge - Balyand having one flight width of 3 m, and the shield portion of the dam spillway having two span of 6 m each, and then to place these building structures new the shield portion of the dam spillway having three span the width of 5 m each equipment shield dam openings and water flown receivers in sharh channels and Hodge - Balyand new Power plane shutter wheel with connection telemechanical control system.

2nd embodiment: destruction (eradication) of the old broken inlet part water receiver in channel Hodge - Balyand , having a passage width of 3 m, and the shield portion spillway dam having two span of 6 m - each construction in place of these constructions new the shield portion spillway dam, - having three span width of 5 m , each equipment shield openings dam radial gates machine level headrace with a counterweight exercising mi entirely on renewable hydraulic energy of water flow , with a connection to telemechanical control system, and equipment the inlet part of the water receivers into the Sharkhiya and Khodzha- Balyand canals instead of the existing old flat gates with water flow stabilizers of the "telescopic sectional box-shaped shield" type, designed by Ya.V. Bochkareva, R.N. Mukhutdinova, AI . Rohman , operating them entirely on renewable hydraulic power from the water flow . with connection to the telemechanical control system .

Proposed these variant s reconstruction improve hydraulic conditions of the downstream spillway dam by increasing the culvert front panelboard of the dam and , hence , SNI w values of the specific water consumption for apron and provide auto th water distribution through the water receiver and into the channels sharh and Khoja - Balyand .

Based on comparisons of feasibility of the proposed 2 variants reconstruction revealed that 2 nd embodiment of the reconstruction is more efficient through the use of hydraulic segmental gate - automatic level of the upstream water flow or stabilizers, economy water in and electricity w and differs less and costs and renovation. At the same time, the coefficient of economic efficiency of capital investments for reconstruction according to option 1 is 25%, and according to option 2, 37%, the payback period of capital investments for reconstruction under option 1 is 4 years, and under option 2 is 2.7 years , therefore we offer the 2nd option reconstruction as the cheapest and most effective.

The second variant of the reconstruction of the Sharkhiya water intake hydroelectric complex is proposed by us for implementation, as the most economical one, it will improve the operating conditions of the Sharkhiya water intake hydroelectric complex and reduce the cost of its operation.

IV.References

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