RESULTS OF THE STUDY ON THE EVALUATION OF THE TECHNICAL CONDITION OF HYDRAULIC STRUCTURES OF RESERVOIRS

Ospanova Dilbar Keulimjaevna
Karakalpak State University
Paluanov Daniyar Tanirbergenovich
Tashkent State Technical University

Summary: The article discusses the results of a study of the technical condition of the operated hydraulic structures of reservoirs. During the operation of hydraulic structures, various effects of long-term operation, shortcomings in the design, construction and operation of the reservoir and factors affecting the reliability of their hydraulic structures are manifested. The main criteria that create reliable operation of reservoirs are given.

Keywords: reservoir, hydraulic structures, exploitation, dam, filtration, pump station, malfunctions.

Introduction. In our republic, most water reservoirs and hydraulic structures of them have been built in the middle of the last century and since that time they have been in continuous use, negative changes in their technical condition have often occurred. Atmospheric, chemical, aggressive factors also influence the change in the technical condition of hydraulic structures in the waters. This causes serious losses to the structures and elements of the hydro technical structures in the waters in which they are used (exploited).

In order to provide the economy of Uzbekistan with water resources, there are 59 water reservoirs that are currently being exploited, of which 29 are in channel and 30 are off-river. As a rule, existing flood reservoirs are also used as reservoirs. Their restoration is carried out with the help of special self-propelled channels or a machine-lifting device from water sources for the purpose of replenishing the natural reserves of the regions with water. The total water volume of all water bodies exceeds 20,0 km^3, of which 1 billion.m^3 more than 5 units, 0,5 to 1 billion.m^3 up to 4 units, from 100 to 500 million.m^3 up to 15 units, from 10 to 100 million.m^3 up to 17 units, 10 million.it consists of less than 18 water bodies per m^3 [1-4].

Of the used water jets, 22 of them have been exploited since 15 to 25 years, 26 of them from 25 to 35 years, 11 of them more than 60 years. Of the 59 water bodies being exploited, 22 are classified objects [5-6].

Research method. The probability of an accident in any water bodies increases when the earth shakes, during floods and other emergency conditions. And in the process of daily use of hydro technical facilities, as a result of various impacts in the period of perennial exploitation, design, construction and exploitation, factors affecting the reliability of reservoirs and their hydro technical facilities arise.

In order to provide an opportunity for reliable exploitation of water bodies, the following basic criteria must be met [3,6-9]:

- at the beginning of the year, the use of a structured dispatch chart, taking into account all the changing conditions of the year, providing all consumers with reliable water supply;

- control the growth of shores, the turbidity of water entering the basin and the application of counter-measures to reduce the useful volume of water in the range of years, while reducing the turbidity rate of the basin;

- high slope of the dam in increasing the reliability of the exploitation of reservoirs prevent such cases as violations of the protective elements, disturbance of the plates in the atmosphere effect (air temperature and humidity change, wind), rupture, silage, absorption;

- in the filtration processes of dams and their floors, a large amount of water in the dams is lost in futility (along with the ground water, the dams of the soil of the body of the dam increase over time as there are accumulated dams or cavities appear, the increase in water consumption in the seepage, the migration of soil layers, washing out;

- the reliability of reservoir dams, their normal sinking and sliding;

- the fact that the ability to prevent and conduct water failures in water-generating facilities is always in a normative state;

- to prevent the failure of mechanical equipment in the waters (accumulation of congestion in the shutter groove, movement of shutter, failure of shutter moving equipment, drives, drives or elements thereof);

- prevention of cases of danger to waterproofing structures and dam caused by the washing of the downstream of reservoirs and the violation of the last adjacent structures (the transfer of large water supplies through waterproofing facilities, the fall of stones or other objects, poor-quality execution of concrete works, the change of River structure during flooding and lower than the dam;

- constant monitoring of measures to prevent the occurrence of power failure or failure of a reserve power source in water bodies;

- the fact that in the water protection zone of reservoirs, it is allowed to conduct activities that only serve the reliable operation of reservoirs and do not adversely affect it;

- the quality of water in aquaculture should be within the limits established for drinking purposes and allowed pollution.

Research results. As an object of research, the Talimarjan water reservoir located in the Nishan District of Kashkadarya region was taken. The district seismicity, where the Talimarjan water reservoir is located, is 7 points, the capital of the building is Class II, the construction was carried out in 1974-19833 years. This reservoir was commissioned for exploitation in 1985 year. The total volume of water ombor-1525 million.m^3, useful volume-1400 million rubles.m^3, dam type-same-sex, 1-dam height-35 m, 2 – dam height – 36 m, water discharge plant type-2 – tower, water permeability in the central part of the dam-360 m^3/s (Figure 1).

a) reservoir bowl

b) upstream slope position

1-picture. Talimarjan water reservoir

According to the results of the study, the technical condition of the reservoir hydraulic structures revealed the following:

1. The top of Dam-1 is in satisfactory condition. Deformations were detected in the slabs P23 – P60 (P – Picket) at the mark 390.0 m on the slabs supporting the berm. There are also deformations in the slope plates attached to the berm. Some of the reinforced concrete slabs in the dam cladding are in a slippery condition and the deformation seams are exposed. At the 390.0 m mark, there is a filtration rate of 6-8 m/s to the collector through a reinforced concrete pipe that carries the sediment. Sand is collected in the pipe under the influence of wind, which may have passed through the water intake well from the rainwater drainage system. The water intake pipe is not protected by a reverse filter from the soil spilled on it. In P46-70 in the collector, water leaked from the slope, as a result of which the slope soil flowed into the collector and created turbid pressure.

2. The drainage pump station is in an emergency condition, there are large depressions, advance camera of the pump station has started to break down. The automatic system that controls the pumps depending on the water level has failed. Fifty percent of the reinforced concrete slabs that reinforce the advance camera slopes have been pushed or are out of place because a filter layer has not been formed on the ground where they are located. Filtration water leaked on the sides of the dam. The leakage height is 2 meters above the water level in the van. Slopes without reinforced concrete slabs were washed away by the filtration stream. The walls of the pump station are cracked due to uneven sinking. When the drainage water came to the pumping station, the highway sank, a tray or pipe carrying rainwater, and a tray carrying water from a gutter drain also sat down. Drainage water is flowing into the advance camera of the pump station from the damaged concrete cover of the rainwater drainage ditch.

3. In the case of a water level above the 392 meter mark on the lower slope, the rise of filtration water was observed.

4. Closed tubular drainage on the right bank of the drain cannot withstand a decrease in the depression curve when the water level is above 392 m, as water is leaking from the wells of № 7 piezometer at P4+ 35 and № 6 and № 7 piezometer at P5+ 70.

To observe the vertical and horizontal displacements, fundamental dams, planned elevation marks, concrete and soil surface marks, depth marks, hydraulic triangulation points are installed on the dam.

In dam 1, 234 piezometer are monitored, 7 piezometer are not working, and 10 have insufficient water level control in the absence of water.

In dam 2, 27 piezometer were used, of which 6 were periodically dry.

Accordingly, 35 piezometer in dam 1 need to be cleaned. 76 running meter for 7 piezometer in dam 1 for re-installation. 67 running meter for 6 piezometer in 2nd dam need to dig a well.

Their sensitivity is low and unsatisfactory due to drilling the wells with a muddy solution and pressing the piezometer filters muddy. It is necessary to check them once a year to increase accuracy. In the reservoir, this work has never been done.

According to data from the Bathymetric Center, the useful capacity of the reservoir as a result of turbidity is 58 million. m^3.

The physical and mechanical characteristics of the soil on the body and ground of the dam have not been studied since the period of operation.

The average sinking rates of the elevation marks on the top of the Talimarjan reservoir dam 1 are given in Table 1.

Table 1

Average immersion speed of height marks above the dam

Field picket	Date	2011	2012	2013	2014	2015	2016	2017	2018
	upstream level, м	393,9	383,0	397,5	382,0	393,5	393,9	394,8	396,9
P-14-29	Vs, mm/y	-4,94	-2,60	-5,64	-2,11	-5,49	-2,31	-8,62	-4,25
P 30-45	Vs, mm/y	-13,26	-1,67	-8,84	-2,56	-6,48	-1,34	-7,53	-3,88
P 46-61	Vs, mm/y	-8,44	-2,17	-6,02	-2,72	-5,31	-1,71	-8,36	-3,35
P 64-80	Vs, mm/y	-7,87	-3,26	-6,39	-2,70	-5,79	-2,35	-9,09	-3,52
P 82-98	Vs, mm/y	-	-2,69	-2,63	-2,83	-6,11	-2,62	-7,76	-3,52

Conclusion. If we compare the rate of deposition of dam stamps from this table, it seems that the water level of the dam is related to the water level (2011-2018). In 2019, this construction was partially carried out by the employees of the operation on drowning speeds, and in 2020 this work was intensified.

In conclusion, in order to ensure that each factor does not occur or has little effect on the results of the examination, it is necessary to identify the causes of their occurrence on the basis of a separate scientific approach to each of them and to take measures to prevent these causes.

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Резюме. Мақолада ҳозирги кунда эксплуатация қилинаётган сув омборлари гидротехника иншоотларининг техник ҳолатини тадқиқ қилиш натижалари масалалари кўриб чиқилган. Гидротехника иншоотларини ишлатиш жараёнида кўп йиллик эксплуатация давридаги турли таъсирлар, лойиҳа, қурилиш ва эксплуатация қилишдаги камчиликлар натижасида сув омборлари ва уларнинг гидротехника иншоотлари ишончлилигига таъсир этувчи омиллар пайдо бўлади. Сув омборларини ишончли эксплуатация қилишга имконият яратувчи асосий мезонлар келтирилган.

Калит сўзлар: сув омбори, гидротехника иншоотлари, эксплуатация, тўғон, фильтрация, насос станция, носозликлар.

Резюме. В статье рассматриваются результаты исследования технического состояния эксплуатируемых гидротехнических сооружений водохранилищ. В процессе эксплуатации гидротехнических сооружений проявляются различные воздействия многолетней эксплуатации, недостатки в проектировании, строительстве и эксплуатации водохранилища и факторы, влияющие на надежность их гидротехнических сооружений. Приведены основные критерии, создающие надежной эксплуатации водохранилищ.

Ключевые слова: водохранилище, гидротехнические сооружения, эксплуатация, плотина, фильтрация, насосная станция, неисправности.