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Research Article

INVESTIGATION OF WATER OVERFLOW THROUGH THE CREST OF EARTH DAMS

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ABSTRACT

The article examines the reasons for the overflow of water from the top of the ground dam. The overflow of water from the top of the ground dam is considered in the example of the sinking of the top of the ground dam of the Talimarjan reservoir. Analysis of the results obtained shows that during the operation, the factors leading to the overflow of water from the top of the ground dam did not occur and its level of safety was ensured.

KEYWORDS

Reservoir, hydraulic structures, operation, ground dam, sinking, filtration.

INTRODUCTION

Ground dams are one of the most common types of hydraulic structures. They include water intake, energy, water transport, reservoir and complex hydropower plants. Ground dams are built to perform a variety of tasks. Dams form large or small reservoirs in which a certain amount of water is collected and used in various sectors of the economy in times of water shortage. Ground dams are also built in the foothills, where there is a risk of flooding, which protects populated areas, agricultural lands and economic facilities, etc. from flood damage [1].According to the International Commission on Large Dams, more than 45,000 large dams have been built around the world, more than 60% of which are

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ground dams. Ground dams are about 3 times less reliable than concrete dams, and accidents in them often occur due to the overflow of water through the dam top, filtration of water through the body and floor of the structure, and disturbance of the stability of the structure [2].

In order to provide the economy of Uzbekistan with sustainable water resources, 59 reservoirs are in operation, all of which, except for the Andijan reservoir, are dams made of ground material.

According to the Japan Water Agency, about 33% of ground dam accidents are related to filtration and 18.7% are due to overflow of water through the dam top [3-6].

RESEARCH METHOD

A number of studies on the filtration of water through the body and ground of ground dams have been conducted, new methods have been developed and put into practice. Overflow of water through the dam top is currently a very complex issue, and although scenarios and technological schemes have been developed, in practice, work on their implementation has not been sufficiently carried out. In practice, the overflow of water through the top of the dam is due to the following main reasons [2]:

- Subsidence of the top of the ground dam. The subsidence of the dam top occurs as a result of compaction of the dam body and ground soils under the influence of extra-project loads (increased transport loads, etc.) or seismic effects (natural or man-made). When the dam top mark reaches the level of accelerated stagnation, water can overflow through the dam and damage the structure;
- The occurrence of excessive flooding or waves. If the culverts cannot withstand the passage of the stream, then the upper bef level rises above the dam's top mark and water flows through it. However, the breakdown of the dam is likely to occur in weak areas, such as the largest subsidence of the dam and other areas adjacent to concrete structures;
- In water discharge structures or non-functioning water discharges that do not allow the passage of the rated flow. This condition is caused by clogging of the drains, repair of drainage structures or lifting mechanisms, failure of the lifting mechanism, power outages and failure of manual lifting mechanisms, etc., as well as the fault of the operator occurs due to maneuvering.

These mentioned reasons are the most important in the overflow of water from the top of the ground dam, and other factors may also be the cause. In this presented work, the overflow of water through the top of the ground dam as a result of subsidence of the top of the ground dam was investigated.

RESEARCH RESULTS

Let's look at the example of the Talimarjan reservoir in Kashkadarya region. The mark on the top of the dam is 404.50. The height indicator of the dam top depends on how well the dam floor and body are seated. The deepest subsidence observed over 15 years of geodetic marks installed on the ground dam is given in the table below.

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A. Table

№	Mark, m	Draft, mm
1	2	3
TP.1	403,565	**-34,2**
P17	403,762	-51,9
P19	403,732	-49,2
P21	403,574	-56,3
P 22	403,720	-59,2
P 24	403,715	-64,2
P 26	403,653	-88,3
P 27	403,733	-69,4
P 29	403,715	-77,1
TP.2	403,505	-72,6
P 31	403,744	-74,3
P 33	403,587	-70,2
P 35	403,609	-70,7
P 37	403,631	-89,8
P 39	403,809	-67,5
P 41	403,521	-74,0
P 43	403,654	-68,3
P 45	403,556	-82,1
P 46	403,635	-75,9
P 49	403,580	**-101,0**

Б. Table

№	Mark, m	Draft, mm
1	2	3
P 51	**403,8196**	-72,5
P 53	403,6634	-60,5
P 55	403,5638	-49,5
TP.3	403,4409	-68,4
P 58	403,4244	-67,8
P 61	403,5475	-38,2
P 64	403,6588	-51,2
TP.4	**403,3377**	-54,9
P 70	403,6243	-61,5
P 73	403,7138	-71,4
P 75	403,7370	-77,7
P 77	403,7424	-69,4
P 80	403,7188	-64,9
P 82	403,6203	-68,2
P 85	403,6121	-67,6
P 88	403,6943	-61,0
P 91	403,7646	-72,6
P 94	403,6688	-43,4
TP.5	403,5397	-47,5

Note: P – Picket

In practice, the largest subsidence on the dam during this period is 101 mm. According to the results of the observation, the vertical displacement was 0.25 ÷ 0.73 cm, the relative difference of sediments between adjacent marks was 0.34 cm, and according to the table, the allowable deformation of the dam top relative to the minimum marks was K1 = 1 ÷ 1.5 cm. As a result, the obtained indicator did not lead to the overflow of water from the top of the ground dam, and the structure was provided with a level of safety during this time.

CONCLUSION

If we compare this table with the sinking rate of the overhead marks, it can be seen that the reservoir depends on the water level. In 2021, the sinking rates at this facility were partially carried out by maintenance personnel, and this work is now being accelerated. Analysis of the results obtained shows that during the operation, the factors leading to the overflow of water from the top of the ground dam did not occur and its level of safety was ensured.

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