

PROBLEMS IN THE USE ARISING OF HYDROTECHNICAL STRUCTURES AND WAYS TO MITIGATE THEM

Paluanov D.T., Mamatkulov D.A., Kenjaev B.O., Gadaev S.K.
Tashkent state technical university (Uzbekistan)

Abstract: *As a result of the use of many hydrotechnical structures in our republic for many years, the level of reliability in their technical capabilities is decreasing. This is causing a number of problems in the hydrotechnical structures. As a result of the research carried out, suggestions were made on the problems existing in the hydrotechnical structures, their elimination and mitigation.*

Keywords: *hydrotechnical structures, dam, safety, filtration, reservoir, reliability, turbid-sediment, pressure slope.*

Uzbekistan pays great attention to the safety of hydrotechnical structures (HTS), which are designed, built and operated in various sectors of the economy. The operational reliability of HTS and their complexes is an integral part of the overall security of Uzbekistan. Currently, there are normative and legal acts reflecting the principles of the law “on the safety of hydraulic structures’ and the HTS [1,2].

Due to the rapid population growth in the context of water scarcity and the need to provide them with sustainable water resources, the HTS plays an important role in managing water use in various sectors of the economy [3]. Despite the large volume of work carried out to ensure the safety of the HTS, the issues of elimination and mitigation of the problems that arise during the period of use (increased filtration, the occurrence of mechanical suffocation, the silencing of grinds in the body of the building, the violation of the stability of slope, the failure of water-discharge structures, etc.) are topical.

In the history of the construction of gidrotechnics, many fatal cases of the ground dam have been observed. Some of them have resulted in many disasters, serious economic, environmental and social losses and damages.

According to the International Commission on Large Dams, more than 45 thousand large dams have been built in the world today, more than 60% of which are ground dams. Ground dams are 3 times lower in reliability than concrete dams, and in most cases, their destruction occurs as a result of increased water flow through the top of the building and filtration of water from the body and ground of the building. According to the Japan Water Agency, approximately 33% of accidents in elevated ground dams are caused by filtration and 18.7% by overflow of water through the top of the structure [4].

For qualitative and quantitative analysis of the conditions of the occurrence of accidents in the exploitation of ground dams, their classification is of great importance, depending on the nature of their occurrence, origin and possible consequences for the object, employees, population, natural and social environment.

Ground HTS, including ground dams in the body and ground, water moves at different speeds depending on certain conditions and reaches a certain "critical" speed.

Ground HTS, including ground dams bodies and groundwater, move at different speeds depending on specific conditions and reach a certain “critical” speed. As the velocity of the water exceeds the critical velocity, the joint movement of water and the soil in the body of the structure and the ground is observed, and small particles of soil begin to move between the large particles. As a result, a process of mechanical suffocation occurs, the load-bearing capacity of the soil decreases sharply with increasing soil porosity.

In the world hydrotechnical practice, there are many cases of reduction of the useful volume of the reservoir as a result of landslides on the banks of many reservoirs. This reduces the service life of the facility and prevents it from collecting the required amount of water. At the same time, floods are becoming more frequent on our planet due to the increasing frequency of natural hazards in nature as a result of global climate change. In recent years, flood-prone natural disasters have become more frequent in the of our republic, which in turn has destroyed hydraulic and engineering structures, especially the volume of reservoirs is filled with turbidity caused by floods. Such cases have been observed in more mountainous and foothill areas, according to research by scientists and experts [5].

Within the framework of the state grant on State scientific and technical programs of Scientific research institute of irrigation and water problems, scientific research was carried out in order to study the technical conditions of the HTS of the water reservoirs being exploited in the republic. Tashkent, Talimarjan, Janubiy Surkhandarya, Kuyimazor, Tudakul, Akhangaran, Andijan, Jizzakh, Kattakurgan, Topolong, Hissarak, Chimkurgan, Pachkamar and Akdarya water reservoirs were observed to be filled with sediments. It is possible to calculate that the main reasons for the fact that the filling speed of the basin to sludge-sediment is higher than indicated in the project, are not provided for by measures against sludge-sediment, both in the project and in the process of using water bodies.

Another important problem in scientific research is the presence of cavities in the body under the plates on the side of the pressurized slope. Such cases were observed in dams of some water bodies, which were being exploited. For example, the upper part of the Kyzylsuv floodwater reservoir dam is in a satisfactory condition, the upper and lower slopes are covered with concrete slabs. As a result of the generating waves and filling-emptying of the reservoir formed under the influence of the wind, non-dangerous fractures appeared in some areas of the structural insulating building sutures. It was also found that there are gaps under some plates. Similar cases have been reported on the banks of the Tashkent Reservoir, and sometimes on the slabs of water intake facilities (figure).



Kyzylsuv flood reservoir



Tashkent reservoir

Figure. Migration of slabs in water outtake structures of reservoir

In the following years, with the sharp development of science, issues of development and introduction of modern advanced technologies and wide application in practice play an important role in the field of construction. Since the years of independence, the main goal has been the widespread use of new innovative methods and modern advanced resource-saving technologies in the design, construction and operation of HTS in the country. Therefore, the use of modern new resource-saving technologies of filtration water devices in the construction of new HTS is of great importance [6].

In this regard, a number of research works on the study, prevention and elimination of the problem noted in our republic, in particular in the world, have been carried out and certain results have been achieved. Scientific research institute of irrigation and water problems, the restoration and repair works are carried out using polymer (composition) materials with high strength and service period in the elimination of defects in the high befi coating of the body of the large reservoir dam, which is being developed and widely applied to the practice, being exploited in our republic.

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Contacts of authors

1. Paluanov Daniyar Tanirbergenovich, PhD in technical sciences, Associate professor, E-mail: doni_pol@mail.ru, Tel.: 97-410-28-32.
2. Mamatkulov Dilmurat Abduganievch, Senior teacher, E-mail: dilmurod-85@inbox.ru
3. Kenjaev Baxtiyor Orzikulovich, Senior teacher, E-mail: kenjaev_1982@mail.ru
4. Gadaev Sodik Kucharovich, assistant, E-mail: gadoevs@tdtu.uz