ISSN: 2350-0328

International Journal of Advanced Research in Science, Engineering and Technology

Vol. 6, Issue 6 , June 2019

Natural Researches on Condition of Reliability and Efficiency of Major Canals of the Tashkent Area

Kazakov E.A.,

Research Institute for Irrigation and Water Problems", Uzbekistan

ABSTRACT: The article discusses the results of field studies of the state of reliability and efficiency of large channels in the Tashkent region. The assessment and analysis of the state of reliability and efficiency of the Tashkent Main Channel, Parkent and KhamdamCanals are made. These data allow the development and implementation of organizational, technical and repair activities aimed at improving their operational reliability and efficiency.

I.INTRODUCTION

Under the conditions of development of the economy grew on the territory of the Tashkent region, the need arises to efficiently and reliably use water resources on large main canals, such as the Tashkent Magistral Canal, Parkent and Khandam Canals. Below we consider the main characteristics.(Fig. 1)

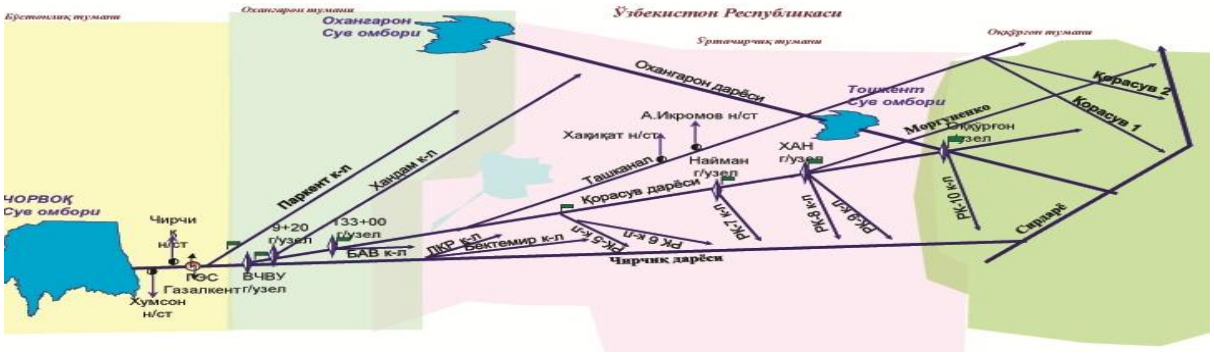


Fig.1. Linear scheme of the Tashkent Magistral Canal, Parkent and Khandam canals.

Tashkent Main Canal (TMC) is built in 1940-1941, the work was carried out by the method of hashar. The canal length (before separation) is 61.1 km, water consumption in the headwork - 87 m³ / s, irrigated area - 65,000 hectares, construction class II. On the route of the channel there are areas in the excavation depth up to 13-15 m and embankment up to 10-13m. The height of the Burjar dam reaches 25 m. The channel is located mainly in the earthen channel. Separate sections of the channel on a total length of 25.27 km have an arm-concrete lining, which is 15–20 cm thick. These are mainly areas of high dams and pebble outcrops in the valleys of the Akhangaran and Gedzhigen rivers.

The Parkent main canal (PMK) passes through the territory of the Bostanlyk, Parkent, Yukori-Chirchik and Akhangaran fogs of the Tashkent province. The channel is intended for irrigation of land on an area of 30.3 thousand hectares in the foothill zone of the Tashkent province. The canal belongs to class II facilities, water intake is carried out from the Chirchik river.

The construction of the channel was carried out in two stages. The first stage, with a length of 69 km from PK0 to PK689 + 68 - was built in the period from 1975 to 1983. The second stage of the channel on the section from PK689 + 68 (Kyzylsai) to PK832 + 58 (Belyutsay) with a length of 14.3 km, built in 1988 - 1997. The section from PK832 + 58 to PK856 + 10 was commissioned in 1998.

ISSN: 2350-0328
International Journal of Advanced Research in Science, Engineering and Technology
Vol. 6, Issue 6 , June 2019

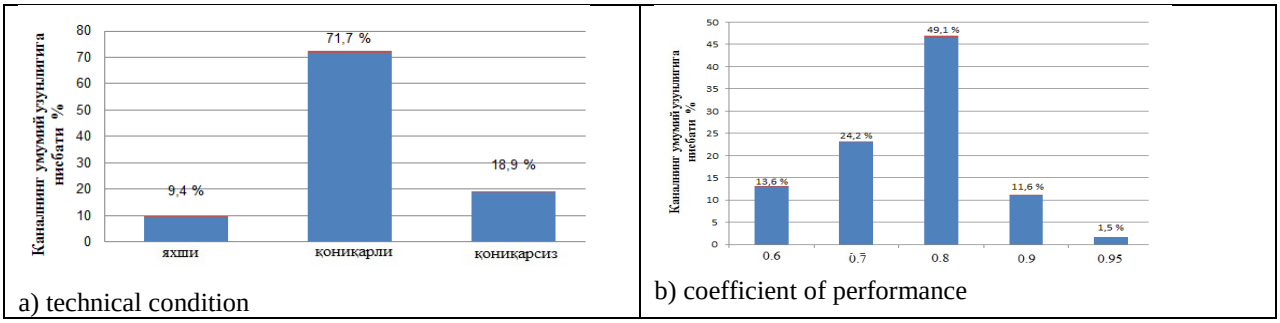
Khandam canal. The canal construction years 1928–1932. The operation of the channel was started in 1932. The design documentation for the facilities and the canal is stored in the Parkent-Karasu UIS. Normal consumption in the head of the canal is 25m3 / s, maximum 31m3 / s., Total length - 74.0 km, including in a concrete facing 55.9 km. The canal route runs in a foothill plain with difficult terrain and is therefore very tortuous in plan.In 1970, at the initiative of regional organizations, a radical reconstruction of the canal was carried out. Handam commands to the right, ends with the inclusion of the irrigation system r. Akhangaran.Handam channel is a very complex hydraulic structure. In the longitudinal profile of the channel, the notches alternate with embankments. The depth of the grooves reaches 25m, the maximum height of the embankment is about 30m.

Fig.2. Technical condition of channels

During the long-term operation of the Tashkent main canal, the Parkent and Khandam canals, a serious problem is the loss of their hydraulic efficiency and reliability, by which we mean ensuring high throughput close to the design capacity with minimum water losses not exceeding the allowable values.

The loss of hydraulic efficiency and reliability will be directly related to the reduction of the throughput costs in the canals and the efficiencies that characterize both the hydraulic indicators and the water losses, mainly due to filtration from their channels. In turn, the hydraulic efficiency and reliability will depend on the technical condition of the canals, their care and operation modes.On the example of the above channels, we will consider the issues of hydraulic efficiency and reliability separately for these channels.

Tashkent main canal. Figure 3 shows general data on the reliability status of the Tashkent main canal, from which it follows that only 9.4% is in good condition, 71.7% in satisfactory condition, and 18.9% in unsatisfactory condition.



a) technical condition

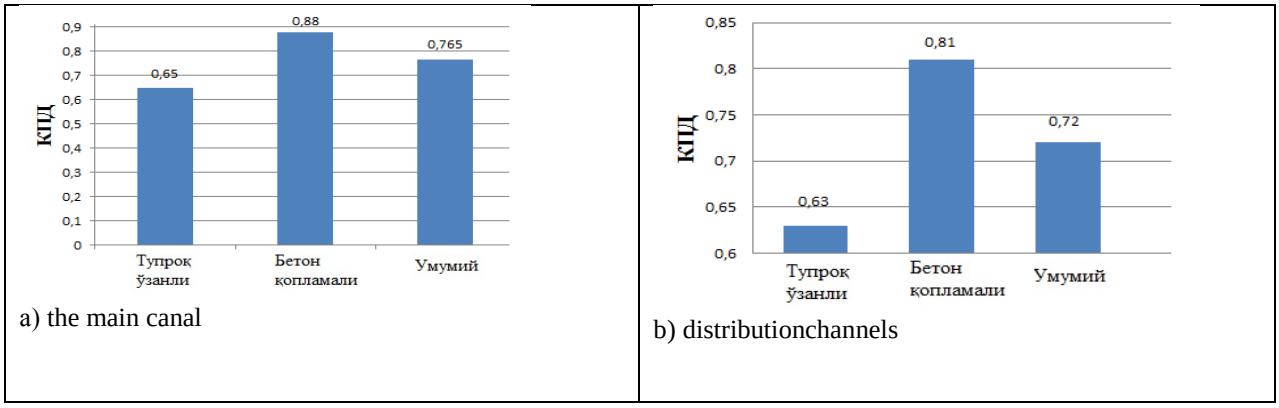
b) coefficient of performance

Fig. 3. - Technical condition of the Tashkent main canal

Hence, 18.9% of the canal is characterized by poor technical condition, and, accordingly, insufficient throughput and the need for capital and current repairs, as well as their reconstruction.

ISSN: 2350-0328
International Journal of Advanced Research in Science, Engineering and Technology
Vol. 6, Issue 6 , June 2019

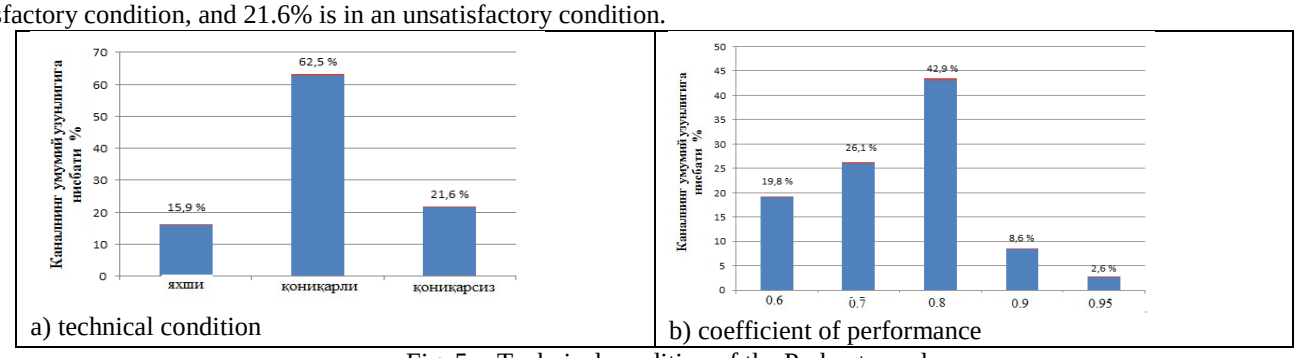
Another histogram in fig.4. indicates that the main channel and distribution channels (about 88%) have an efficiency from 0.63 to 0.88 and only 12% - from 0.90 and more. As is known, according to SNiP, the normative value of the efficiency of main and distribution channels should be at least 0.90. Since the efficiency characterizes both throughput and losses during channel operation, it can be considered that the overwhelming majority of channels have low or insufficient hydraulic efficiency and reliability [1,2].



a) the main canal b) distributionchannels

Fig. 4. - Efficiency of the Tashkent main canal and diverting irrigation systems.

Parkent Channel. From the histogram fig.5. it can be seen that only 15.9% is in good condition, 62.5% is in a satisfactory condition, and 21.6% is in an unsatisfactory condition.

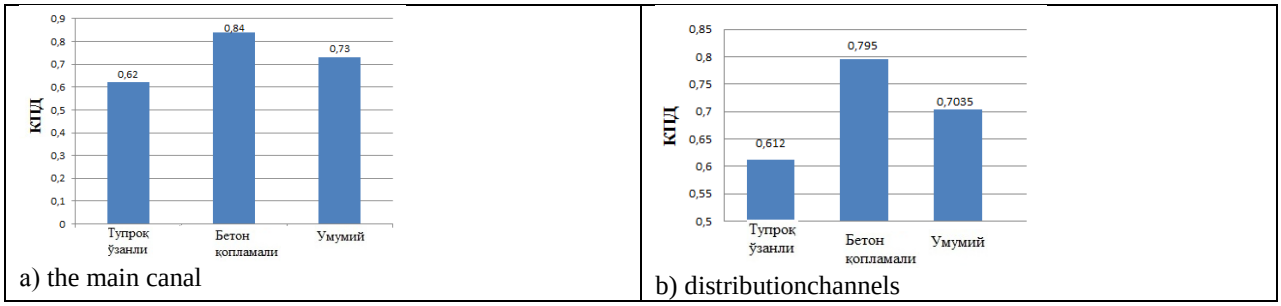


a) technical condition b) coefficient of performance

Fig. 5. - Technical condition of the Parkent canal.

Hence, 21.6% of the canal is characterized by poor technical condition, and, accordingly, insufficient throughput and the need for capital and current repairs, as well as their reconstruction.

The histogram in Figure 6 indicates that the main channel and distribution channels have an efficiency from 0.61 to 0.84. As the efficiency characterizes a condition of reliability of the channel.

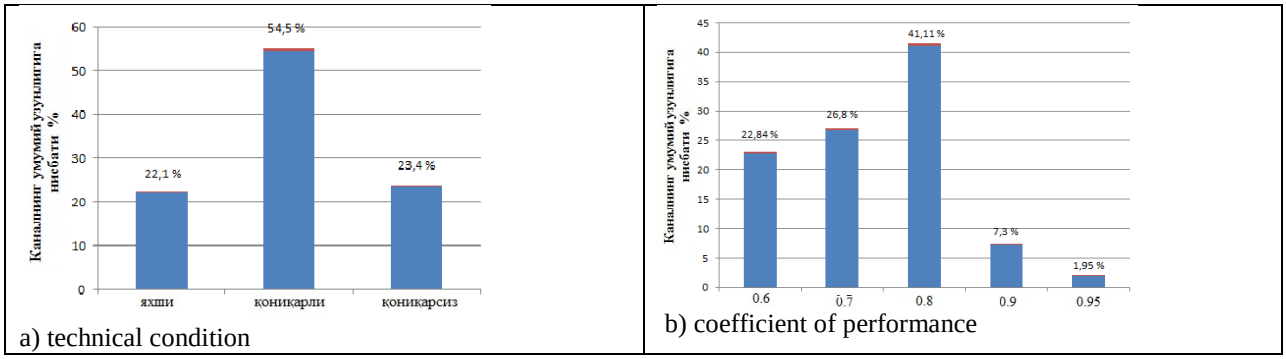


a) the main canal b) distributionchannels

Fig.6.– Efficiency of the Parkent canal and diverting irrigation systems

Khandam canal. From the histogram fig.7. it can be seen that only 22.1% is in good condition, 54.5% is in a satisfactory condition, and 23.4% is in an unsatisfactory condition.

ISSN: 2350-0328
International Journal of Advanced Research in Science, Engineering and Technology
Vol. 6, Issue 6 , June 2019

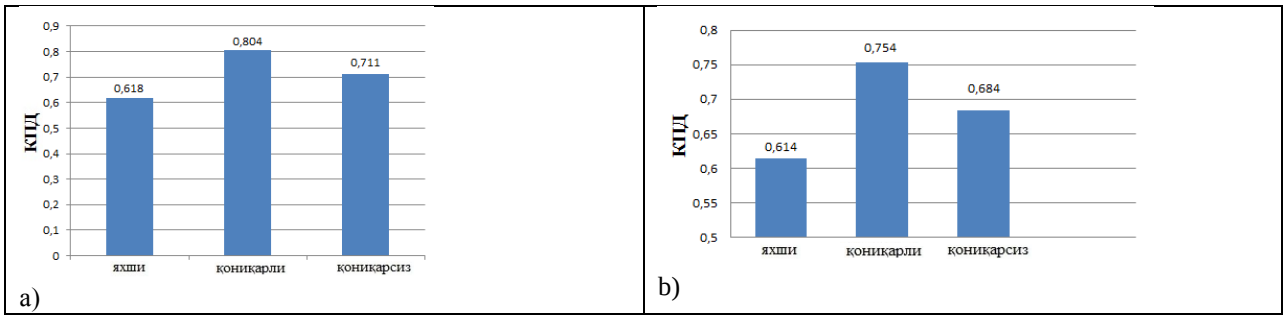


a) technical condition b) coefficient of performance

Fig. 7. - Technical condition of the Khandam channel.

Hence, 23.4% of the canal is characterized by poor technical condition, and, accordingly, insufficient throughput and the need for major and current repairs, as well as their reconstruction.

Another histogram in Fig. 8 indicates that the main channel and distribution channels have an efficiency from 0.61 to 0.80. Since the efficiency characterizes the reliability status of the channel.



a) b)

Fig. 8— Efficiency of the canal to the Khandam and diverting irrigation systems

Among the main operational factors affecting the performance of both channels in the earthen channel and lining especially the overgrowing of channels by aquatic vegetation, erosion and various deformations of their channels, silting, untimely maintenance and repair of channels, destruction of plates and seams of facings which are largely affect their hydraulic efficiency and reliability [1].

Examples with characteristic conditions for reducing the hydraulic efficiency and operational reliability of the surveyed canals are the Parkentsky and Khandamsky MK in the earthen channel, where there is a significant overgrowth of aquatic vegetation, silting and alga formation on the lined canal [2].

The results of field studies on the actual values of the efficiency of the irrigation canals showed that the average efficiency of the main canals is 0.829, which is 7% lower than the minimum SNiP requirements. At the same time, the efficiency of main canals in the earthen channel is 0.790, which is already 11% lower than the requirements of SNiP, and for channels in lining the average efficiency is 0.870, which is also lower than the required value for veneered channels according to the recommendations of SNiP - by 8-10%.

As for the distribution channels of irrigation systems (Fig. 8 b), their average efficiency is 0.735, which is 19% lower than the minimum SNiP requirements. For channels in the earthen channel, the average efficiency is 0.629, which is 29.2% lower than the minimum requirements, and for channels in lining - 0.813, which is 16% lower than the minimum requirements. Thus, the use of water for irrigation is 1864 million m3 / year, with an average efficiency of irrigation canals, the loss in them will be 19%, and the total volume of losses - 354.2 million m3 / year.

II. CONCLUSION

On the basis of the analysis carried out and the studies performed, the following problems of hydraulic efficiency and reliability of irrigation canals can be noted:

• During the operation of the Parkentsky and Khandamsky canals, additional hydraulic resistances arise in the channels, mainly due to the siltation of the canal, which leads to a significant reduction in their carrying capacity.

ISSN: 2350-0328

International Journal of Advanced Research in Science, Engineering and Technology

Vol. 6, Issue 6 , June 2019

• Tashkent main canal with flow rates of more than 50 m3 / s. The prevailing factors can be various deformations of channels (erosion), which lead to a snowing of the state of reliability of the channel.

REFERENCES

1. Makhmudov I., Sadiyev Y. “SuvResourcelari Bosh-Darwin Bar қ arorligivaSamaradorligi” беки Uzbekistan, “Kishlo”, “Zhaligi” Journal No. 12 Tashkent, 29 beta.

2. Sadiev U "Improving the hydraulic efficiency and operational reliability of large canals" Hydrotechnics magazine Russia №2 2016y 60-61 beta.