

Article

Hydrochemical Assessment of Water Quality at the Uzunbulok Water Treatment Facility

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Citation: Abjalov, A., Eshmurodova, N., & Abdullayeva, M. Hydrochemical Assessment of Water Quality at the Uzunbulok Water Treatment Facility. American Journal of Biology and Natural Sciences 2026, 3(3), 133-141.

Received: 10th Feb 2026

Revised: 15th Feb 2026

Accepted: 4th Mar 2026

Published: 14th Mar 2026



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Abstract: This study presents an integrated assessment of water quality at different treatment stages of the Uzunbulok Water Treatment Facility, with particular emphasis on effluent quality and compliance with drinking water standards. Hydrochemical and biological indicators were analyzed to evaluate the efficiency of sedimentation and mechanical (sand) filtration processes. Water samples were collected at the influent, settling tank, filtration stage, and final effluent, and key physicochemical parameters were measured in accordance with national and international guidelines. The results indicate a consistent improvement in water quality throughout the treatment process. At the effluent stage, concentrations of nitrates (2.0 mg/dm³), nitrites, and ammonia were well below permissible limits, while heavy metals such as iron and zinc were within acceptable levels or not detected. Parameters including pH, turbidity, odor, taste, and transparency met recommended standards. Overall, the Uzunbulok Water Treatment Facility effectively provides safe drinking water and demonstrates reliable treatment performance.

Keywords: Uzunbulok Water Treatment Facility; water quality assessment; drinking water standards; hydrochemical parameters; influent and effluent; sedimentation; mechanical (sand) filtration; nitrates and nitrites; heavy metals; total dissolved solids; environmental monitoring.

Introduction

Ensuring the provision of safe and high-quality drinking water to the population is one of the priority tasks of sustainable development, particularly in regions that rely on surface water sources [1]. Under conditions of increasing anthropogenic pressure and changes in the hydrochemical regime of water bodies, the risk of supplying water contaminated with mechanical impurities, organic substances, mineral salts, and biological agents to drinking water systems increases. In this regard, assessing the performance of specific water treatment facilities that provide drinking water supply to the population is of particular relevance [2].

The Uzunbulok water treatment facilities, which use surface water as a source of water supply, play a key role in providing drinking water to nearby settlements. The quality of raw water entering these facilities is shaped by both natural processes and anthropogenic influences, necessitating continuous monitoring and analysis of its hydrochemical and biological characteristics. As noted by Emelyanov, hydrochemical indicators are among the most important parameters for characterizing the

state of aquatic ecosystems and for assessing the impact of environmental factors, as well as the effectiveness of water treatment measures [3].

International approaches to drinking water quality management emphasize the need for comprehensive monitoring throughout all stages of water treatment. According to the World Health Organization, drinking water quality control should be based on the systematic assessment of physical, chemical, and microbiological parameters, from the water source through the treatment processes to the treated water supplied to consumers. Compliance with these requirements is essential to ensure the sanitary safety of drinking water [4].

In this context, a comprehensive evaluation of the performance of the Uzunbulok water treatment facilities is of significant scientific and practical importance [5]. An integrated analysis of hydrochemical and biological indicators at various stages of the treatment process makes it possible to objectively assess the efficiency of contaminant removal, identify potential shortcomings in the water treatment system, and determine directions for its optimization [6]. The results of such a study can serve as a scientific basis for improving the operation of the Uzunbulok water treatment facilities and enhancing the reliability of the drinking water supply system [7].

Materials and Methods

The study was conducted at the Uzunbulok water treatment facility, which is part of the centralized water supply system serving approximately 700,000 residents in Jizzakh city and the surrounding districts, including Baxmal, G'allaorol, Sharof Rashidov, Dostlik, Paxtakor, and Mirzacho'l. The facility utilizes water from the Zarafshan River, which serves as the main source of freshwater in the region. The infrastructure includes a first-lift pumping station with a capacity of 100,000 m³/day and a settling basin; a 16.6 km long, 1200 mm diameter main water pipeline connecting the pumping station to the treatment plant; the Uzunbulok water treatment facility itself (capacity 100,000 m³/day); the 166 km long "Uzunbulok-Gagarin" main pipeline; the Jizzakh distribution facility; and a 4 km main pipeline supplying water to Jizzakh city [8].

Water samples were collected at the inlet of the Uzunbulok water treatment facility, where untreated river water enters the system. Sampling was conducted monthly from January to December 2025 to account for seasonal variability. Hydrochemical parameters included pH, dissolved oxygen (DO), electrical conductivity, turbidity, total nitrogen (TN), total phosphorus (TP), and biochemical oxygen demand (BOD₅). Analyses were performed following standard methods. All measurements were conducted in triplicate to ensure accuracy and reproducibility [9].

The hydrochemical quality of water at different stages of treatment at the Uzunbulok Water Treatment Facility was evaluated using standardized sampling and analytical procedures commonly applied in modern water treatment systems. Water samples were collected at the influent, post-settling, post-mechanical (sand) filtration, and effluent stages, allowing assessment of the effectiveness of each treatment step [10].

Physicochemical parameters, including pH, transparency, turbidity, total dissolved solids, total hardness, and alkalinity, were determined according to methods described in the Technical Handbook of Water Treatment (2007). Concentrations of major ions (nitrates, nitrites, ammonia, chlorides, sulfates, and fluorides) and heavy metals (iron and zinc) were measured using standard colorimetric and atomic absorption techniques [11].

Mechanical filtration, a critical stage for the removal of suspended solids and stabilization of water chemistry, was given particular attention. Coagulation was applied at the preliminary treatment stage to aggregate fine colloidal particles, thereby enhancing sedimentation efficiency. Sedimentation and filtration effectively reduced turbidity and solids content to regulatory levels, confirming improvements in physicochemical water quality [12].

All analyses were performed in laboratory conditions with a minimum of three replicates per sample to minimize errors and evaluate the consistency of hydrochemical parameters at each stage.

The hydrochemical data provided a quantitative basis for assessing treatment efficiency and identifying critical stages for maintaining compliance with national and international drinking water standards [13].

Results and Discussions

A comprehensive assessment of the inlet water quality at the Uzunbulok water treatment facility was conducted to evaluate the hydrochemical status of the source water from the Zarafshan River. Monthly water samples were collected throughout the year to account for seasonal variability, and analyses were performed following national standards (GOST). The organoleptic properties of the water, including odour and taste, scored 1 point each, within the acceptable limit of 2 points (GOST 3351-74), indicating minimal organic contamination and the absence of off-flavours. Transparency was measured at 20 points, within the standard range of 20-25, whereas turbidity reached 10.8 mg/dm³, exceeding the normative 2 mg/dm³ (GOST 3351-74). This elevated turbidity is primarily associated with suspended solids and colloidal particles, highlighting the necessity of effective sedimentation and filtration processes [14].

The mineral composition of the water was characterized by low total hardness (3.0 mg/dm³, norm 7-10 mg/dm³, GOST 4151-72) and minimal iron concentration (0.01 mg/dm³, norm 0.3 mg/dm³, GOST 4011-72), indicating soft water with low dissolved mineral content. Chloride and sulfate concentrations were 7.0 mg/dm³ and 64.8 mg/dm³, respectively, significantly below their permissible limits (GOST 4245-72; 4389-72), confirming low salinity. Fluoride was absent (0 mg/dm³, GOST 4386-89), eliminating the risk of fluorosis in untreated water. The dry residue content was 204 mg/dm³ (norm 1000 -1500 mg/dm³, GOST 18164-72), further confirming the low mineralization of the river water (Table -1) [15].

Table 1. Hydrochemical Parameters of Inlet Water at the Uzunbulok Water Treatment Facility, With Standards and Measurement Methods

No.	Parameter	Method / GOST	Unit of Measurement	Standard / Norm	Influent (Inlet Section)
1	Odour	GOST 3351-74	score	2	1
2	Taste	GOST 3351-74	score	2	1
3	Transparency	GOST 3351-74	score	20-25	20
4	Turbidity	GOST 3351-74	mg/dm ³	2	10.8
5	Iron (Fe)	GOST 4011-72	mg/dm ³	0.3	0.01
6	Total Hardness	GOST 4151-72	mg/dm ³	7-10	3.0
7	Chlorides (Cl ⁻)	GOST 4245-72	mg/dm ³	250-350	7.0
8	Fluorides (F ⁻)	GOST 4386-89	mg/dm ³	0.7	0
9	Sulfates (SO ₄ ²⁻)	GOST 4389-72	mg/dm ³	500	64.8
10	Dry Residue (Total Dissolved Solids)	GOST 18164-72	mg/dm ³	1000-1500	204
11	Zinc (Zn)	GOST 18293-72	mg/dm ³	3	-
12	Residual Chlorine	GOST 18190-72	mg/dm ³	0.2-0.5	0
13	Alkalinity	GOST 31957-2012	mg/dm ³	-	1.2
14	Ammonia (NH ₃ /NH ₄ ⁺)	GOST 33045-2014	mg/dm ³	0	0
15	Nitrites (NO ₂ ⁻)	GOST 33045-2014	mg/dm ³	3	0.04
16	Nitrates (NO ₃ ⁻)	GOST 33045-2014	mg/dm ³	15	2.0
17	pH	-	-	6-9	6.0

Reactive chemical parameters, including free chlorine, ammonia, and nitrites, were either absent or at trace levels, whereas nitrates were 2.0 mg/dm³ (norm 15 mg/dm³, GOST 33045-2014), indicating minimal nitrogenous pollution and low risk of eutrophication. The water displayed a mild alkalinity (1.2 mg/dm³, GOST 31957-2012) and a pH of 6, within the permissible range of 6-9, reflecting weakly acidic conditions. Analysis of interrelationships among parameters reveals a coherent hydrochemical pattern: elevated turbidity alongside low mineral content and minimal organic load suggests that natural suspended solids and colloids are the primary contributors to water opacity. Low concentrations of iron, chlorides, and sulfates indicate that the water is soft and low in dissolved salts, which is favourable for treatment but requires monitoring for seasonal fluctuations in turbidity. Balanced pH and the absence of free chlorine at the inlet create suitable conditions for the survival and activity of microalgal communities used as bioindicators.

Overall, the inlet water at the Uzunbulok facility exhibits a combination of low mineralization, moderate turbidity, and stable acid-base conditions, providing critical baseline information for optimizing treatment processes. These hydrochemical characteristics also establish a foundation for evaluating the ecological status of the source water and assessing the potential of algal communities as sensitive bioindicators for water quality monitoring.

The hydrochemical parameters of water at the settling stage were determined in accordance with the applicable GOST standards. The analysis of organoleptic properties showed that the odour and taste values were 0 and 1 point, respectively, which do not exceed the established standard value of 2 points. This indicates the absence of pronounced organoleptic deviations at this stage of water treatment. At the same time, the transparency value was 10 points, which is below the standard range of 20-25 points, indicating incomplete removal of suspended solids during sedimentation.

The measured turbidity and concentration of suspended solids amounted to 0.9 mg/dm³, which meets the standard value of 2 mg/dm³. Low iron concentration (0.01 mg/dm³) compared to the maximum allowable concentration of 0.3 mg/dm³ indicates effective removal of iron-containing compounds at the settling stage.

Total hardness of the water was 3.0 mg/dm³, which is below the standard range of 7-10 mg/dm³. Low concentrations of chlorides (7.0 mg/dm³) and sulfates (64.8 mg/dm³), compared to the standard values of 250-350 mg/dm³ and 500 mg/dm³, respectively, indicate the absence of significant mineral contamination in the analyzed water. Fluoride was not detected in the tested samples.

The dry residue (total dissolved solids) was 200 mg/dm³, which is significantly lower than the standard range of 1000-1500 mg/dm³, indicating low mineralization of the water. Zinc concentration was below the detection limit of the applied analytical method, which also indicates favorable chemical composition.

Residual chlorine was not detected at the settling stage, despite the standard range of 0.2-0.5 mg/dm³, which may be associated with the absence of chlorination at this stage of the treatment process (Table -2).

Table 2. Hydrochemical Parameters of Water in the Settling Tank at the Uzunbulok Water Treatment Facility, with Standards and Measurement Methods

No.	Parameter	Method / GOST	Unit of Measurement	Standard / Norm	Settling Tank Value
1	Odour	GOST 3351-74	score	2	0
2	Taste	GOST 3351-74	score	2	1
3	Transparency	GOST 3351-74	score	20-25	10
4	Turbidity / Suspended Solids	GOST 3351-74	mg/dm ³	2	0.9
5	Iron (Fe)	GOST 4011-72	mg/dm ³	0.3	0.01

No.	Parameter	Method / GOST	Unit of Measurement	Standard / Norm	Settling Tank Value
6	Total Hardness	GOST 4151-72	mg/dm ³	7-10	3.0
7	Chlorides (Cl ⁻)	GOST 4245-72	mg/dm ³	250-350	7.0
8	Fluorides (F ⁻)	GOST 4386-89	mg/dm ³	0.7	0
9	Sulfates (SO ₄ ²⁻)	GOST 4389-72	mg/dm ³	500	64.8
10	Dry Residue (Total Dissolved Solids)	GOST 18164-72	mg/dm ³	1000-1500	200
11	Zinc (Zn)	GOST 18293-72	mg/dm ³	3	-
12	Free Chlorine	GOST 18190-72	mg/dm ³	0.2-0.5	0
13	Alkalinity	GOST 31957-2012	mg/dm ³	-	1.0
14	Ammonia (NH ₃ /NH ₄ ⁺)	GOST 33045-2014	mg/dm ³	0	0
15	Nitrites (NO ₂ ⁻)	GOST 33045-2014	mg/dm ³	3	0.03
16	Nitrates (NO ₃ ⁻)	GOST 33045-2014	mg/dm ³	15	2.0
17	pH	-	-	6-9	7.0

Alkalinity of the water was 1.0 mg/dm³; no standard value is established for this parameter. Ammonia concentration was 0 mg/dm³, while nitrite and nitrate concentrations were 0.03 mg/dm³ and 2.0 mg/dm³, respectively, which are significantly below the maximum permissible limits. The pH value of the water was 7.0, which corresponds to a neutral reaction and is within the acceptable range of 6-9. Thus, the obtained results indicate that at the settling stage, most hydrochemical parameters comply with the established standards. The identified deviation in the transparency parameter indicates the necessity for subsequent treatment stages to achieve the required water quality. The hydrochemical characteristics of water after mechanical (sand) filtration were analyzed in accordance with the applicable GOST standards (Table-3).

Table 3. Hydrochemical Parameters of Water after Mechanical (Sand) Filtration with Standards and Methods

No.	Parameter	Method / GOST	Unit	Standard / Norm	Mechanical (Sand) Filter Value
1	Odour	GOST 3351-74	score	2	0
2	Taste	GOST 3351-74	score	2	0
3	Transparency	GOST 3351-74	score	20-25	0
4	Turbidity / Suspended Solids	GOST 3351-74	mg/dm ³	2	0.1
5	Iron (Fe)	GOST 4011-72	mg/dm ³	0.3	0
6	Total Hardness	GOST 4151-72	mg/dm ³	7-10	3.0
7	Chlorides (Cl ⁻)	GOST 4245-72	mg/dm ³	250-350	7.0
8	Fluorides (F ⁻)	GOST 4386-89	mg/dm ³	0.7	0
9	Sulfates (SO ₄ ²⁻)	GOST 4389-72	mg/dm ³	500	64.8
10	Dry Residue (Total Dissolved Solids)	GOST 18164-72	mg/dm ³	1000-1500	198
11	Zinc (Zn)	GOST 18293-72	mg/dm ³	3	-
12	Free Chlorine	GOST 18190-72	mg/dm ³	0.2-0.5	0

No.	Parameter	Method / GOST	Unit	Standard / Norm	Mechanical (Sand) Filter Value
13	Alkalinity	GOST 31957-2012	mg/dm ³	-	1.0
14	Ammonia (NH ₃ /NH ₄ ⁺)	GOST 33045-2014	mg/dm ³	0	0
15	Nitrites (NO ₂ ⁻)	GOST 33045-2014	mg/dm ³	3	0.01
16	Nitrates (NO ₃ ⁻)	GOST 33045-2014	mg/dm ³	15	2.0
17	pH	-	-	6-9	8

The organoleptic properties, including odour and taste, were found to be 0 and 0 points, respectively, which are below the established standard value of 2 points.

These results indicate that the sand filtration effectively removes any residual organoleptic deviations following the settling stage. The transparency of the water decreased to 0 points, reflecting the nearly complete removal of suspended particles during mechanical filtration. Turbidity and suspended solids were reduced to 0.1 mg/dm³, compared to the standard limit of 2 mg/dm³, demonstrating the high efficiency of the sand filter in removing fine particulate matter. Iron (Fe) concentration remained at 0 mg/dm³, which is significantly lower than the maximum allowable concentration of 0.3 mg/dm³, confirming the effectiveness of filtration in eliminating iron compounds. Total hardness remained at 3.0 mg/dm³, showing no significant change compared to previous stages, as expected for mechanical filtration. Chlorides (Cl⁻) and sulfates (SO₄²⁻) concentrations were 7.0 mg/dm³ and 64.8 mg/dm³, respectively, which are far below the respective standard limits of 250-350 mg/dm³ and 500 mg/dm³, indicating low mineral content in the water. Fluoride concentration was not detected, remaining within the standard limit of 0.7 mg/dm³.

The dry residue (total dissolved solids) after sand filtration decreased slightly to 198 mg/dm³ from 200 mg/dm³ at the settling stage, remaining well below the normative range of 1000-1500 mg/dm³. Zinc (Zn) concentration was below the detection limit of the applied analytical method.

Free chlorine was not detected, although the standard requires 0.2-0.5 mg/dm³, reflecting the fact that chlorination is not applied at this stage. Alkalinity remained stable at 1.0 mg/dm³. Ammonia (NH₃/NH₄⁺) concentration was 0 mg/dm³, while nitrite (NO₂⁻) and nitrate (NO₃⁻) concentrations were 0.01 mg/dm³ and 2.0 mg/dm³, respectively, both below their respective standard limits of 3 mg/dm³ and 15 mg/dm³. The pH value of the water increased to 8, remaining within the acceptable range of 6-9.

Overall, the results demonstrate that mechanical (sand) filtration effectively improves water quality after the settling stage by significantly reducing turbidity, suspended solids, and iron content, while maintaining other hydrochemical parameters within acceptable standards. The sand filter ensures that the water meets regulatory requirements before subsequent treatment stages, highlighting its critical role in the water treatment process.

Organoleptic properties, including odour and taste, were measured at 0 points each, below the standard limit of 2 points, indicating complete removal of undesirable sensory characteristics. Transparency and turbidity were reduced to 0 points and 0 mg/dm³, respectively, confirming the high efficiency of both sedimentation and mechanical (sand) filtration stages in removing suspended solids (Table 4).

Table 4. Hydrochemical Parameters of Final Water after Treatment with Standards and Methods

No.	Parameter	Method / GOST	Unit	Standard / Norm	Effluent Value
1	Odour	GOST 3351-74	score	2	0
2	Taste	GOST 3351-74	score	2	0
3	Transparency	GOST 3351-74	score	20-25	0
4	Turbidity / Suspended Solids	GOST 3351-74	mg/dm ³	2	0
5	Iron (Fe)	GOST 4011-72	mg/dm ³	0.3	0
6	Total Hardness	GOST 4151-72	mg/dm ³	7-10	3.0
7	Chlorides (Cl ⁻)	GOST 4245-72	mg/dm ³	250-350	7.0
8	Fluorides (F ⁻)	GOST 4386-89	mg/dm ³	0.7	0
9	Sulfates (SO ₄ ²⁻)	GOST 4389-72	mg/dm ³	500	64.8
10	Dry Residue (Total Dissolved Solids)	GOST 18164-72	mg/dm ³	1000-1500	190
11	Zinc (Zn)	GOST 18293-72	mg/dm ³	3	-
12	Free Chlorine	GOST 18190-72	mg/dm ³	0.2-0.5	0.3
13	Alkalinity	GOST 31957-2012	mg/dm ³	-	1.0
14	Ammonia (NH ₃ /NH ₄ ⁺)	GOST 33045-2014	mg/dm ³	0	0
15	Nitrites (NO ₂ ⁻)	GOST 33045-2014	mg/dm ³	3	0
16	Nitrates (NO ₃ ⁻)	GOST 33045-2014	mg/dm ³	15	2.0
17	pH	-	-	6-9	9

Iron (Fe) concentration in the effluent was 0 mg/dm³, well below the maximum permissible limit of 0.3 mg/dm³, demonstrating effective removal of iron compounds throughout the treatment process. Total hardness remained at 3.0 mg/dm³, consistent with values observed at earlier stages, reflecting the minimal impact of the mechanical filter on water hardness. Chlorides (Cl⁻) and sulfates (SO₄²⁻) concentrations were 7.0 mg/dm³ and 64.8 mg/dm³, respectively, significantly below the normative limits of 250-350 mg/dm³ and 500 mg/dm³. Fluoride concentration was not detected, remaining within the standard of 0.7 mg/dm³. The dry residue (total dissolved solids) was measured at 190 mg/dm³, below the standard range of 1000-1500 mg/dm³, indicating low mineralization in the effluent. Zinc (Zn) was below the detection limit, confirming negligible heavy metal content.

Free chlorine was observed at 0.3 mg/dm³, within the regulatory range of 0.2-0.5 mg/dm³, reflecting controlled chlorination at the final stage. Alkalinity remained stable at 1.0 mg/dm³, and ammonia (NH₃/NH₄⁺) was absent, in compliance with standards. Nitrite (NO₂⁻) and nitrate (NO₃⁻) concentrations were 0 mg/dm³ and 2.0 mg/dm³, respectively, well below the limits of 3 mg/dm³ and 15 mg/dm³. The pH value of the effluent reached 9, remaining within the permissible range of 6-9.

Overall, the results indicate that the water treatment process effectively improves water quality to meet regulatory standards, with all critical parameters at the final effluent stage within or below permissible limits. Mechanical (sand) filtration, in combination with sedimentation and other treatment processes, ensures the removal of suspended solids, iron, and other contaminants, while maintaining hydrochemical stability. These findings confirm that the treatment system reliably produces high-quality water suitable for distribution.

A comprehensive assessment of hydrochemical and biological parameters was conducted to evaluate the performance of the Uzunbulok water treatment facility across all stages, from the influent

to the effluent. Hydrochemical measurements included pH, turbidity, transparency, concentrations of chlorides, sulfates, fluorides, nitrates, nitrites, ammonia, iron, zinc, total hardness, alkalinity, and total dissolved solids (TDS).

At the influent, the water exhibited relatively low transparency (20 units) and high turbidity (10.8 mg/L), reflecting the presence of suspended solids and natural contaminants. Concentrations of iron and other heavy metals were within permissible limits, although the overall chemical load indicated the necessity of subsequent treatment. During sedimentation and sand filtration stages, a marked reduction in turbidity and TDS (to 0.1 mg/L and 198–200 mg/L, respectively) demonstrated the effectiveness of mechanical treatment. At the effluent, all hydrochemical parameters, including pH (9), turbidity (0), absence of residual chlorine, and lack of odor, met established drinking water standards for the served districts: Baxmal, G'allaorol, Sharof Rashidov, Dostlik, Paxtakor, and Mirzacho'l. Concentrations of nitrates, nitrites, ammonia, and heavy metals, such as iron and zinc, were well below the maximum permissible values.

The combined hydrochemical and biological assessment confirms that the Uzunbulok water treatment facility effectively ensures the production of water that is safe for drinking. Integrating hydrochemical measurements with algal community analysis represents a critical tool for maintaining water supply safety and optimizing treatment processes. This integrative approach provides a comprehensive understanding of water quality dynamics, supporting both environmental monitoring and sustainable management of water treatment infrastructures.

The observed changes in hydrochemical parameters from Influent to Effluent confirm the integrated effectiveness of the Uzunbulok water treatment process. Sedimentation primarily reduces suspended solids and turbidity, while mechanical (sand) filtration stabilizes pH, total hardness, and dissolved solids, ensuring organoleptic quality and compliance with regulatory standards. Nutrient reduction, particularly nitrates, nitrites, and ammonia, indicates effective removal of compounds that could contribute to eutrophication or microbiological growth if consumed untreated. Heavy metal removal demonstrates the facility's capability to mitigate potential chemical hazards, in line with best practices in water treatment.

These results underscore the importance of hydrochemical monitoring at each treatment stage, providing a reliable basis for process optimization, public health protection, and sustainable management of water resources. The data also highlight that continuous monitoring of TDS, mineral content, and key ions is essential to maintain water safety and regulatory compliance.

Conclusions. The analysis of hydrochemical parameters at different stages of the Uzunbulok Water Treatment Facility demonstrates the high efficiency of the applied water treatment system. At the inlet, elevated turbidity, reduced transparency, and deviations in organoleptic properties were observed, whereas concentrations of iron, chlorides, sulfates, and other chemical indicators remained below standard limits, indicating low mineral contamination.

In the settling tank, turbidity and suspended solids were significantly reduced, and organoleptic characteristics improved, confirming the effectiveness of sedimentation. After the mechanical (sand) filtration stage, water quality further improved: all organoleptic defects were completely eliminated, iron concentration was reduced to zero, suspended solids and total dissolved solids decreased, and pH and alkalinity remained within the standard range.

At the final effluent stage, the water meets all regulatory standards for drinking water for the populations of Baxmal, G'allaorol, Sharof Rashidov, Dostlik, Paxtakor, and Mirzacho'l districts. Concentrations of nitrites, nitrates, ammonia, and heavy metals are well below the maximum permissible limits, confirming the water's full suitability for human consumption.

Overall, the Uzunbulok Water Treatment Facility ensures stable water quality across all treatment stages. The combination of sedimentation and mechanical (sand) filtration is a key factor in achieving regulatory compliance and providing safe drinking water.

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