DISCHARGE WATER QUALITY

Important sampling points for assessing discharge water quality are: (1) at the ETP discharge, especially concentrations for cyanide (2) at the STP discharge, (3) at the point where the combined discharges arrive at the 'Compliance Point' or 'End of Mixing Zone' (EMZ).

Our sampling results and government inspections show that the ETP is highly successful in reducing cyanide to appropriate levels (see also Independent Survey section below).

For the STP, discharge concentrations show that the process is effective in reducing key parameters of interest, especially BOD, to appropriate levels.

At the Compliance Point or EMZ, the water quality typically meets designated water quality standards. Where concentrations were higher (for example, for manganese, magnesium, aluminium and iron), it is normally due to naturally elevated concentrations in the local environment (background levels) or the concentrations do not represent a risk to human health or the environment.

INDEPENDENT SURVEY

At the request of the Kyrgyz Government sponsored State Commission, an independent assessment of water quality was carried out in 2012. This was done by German experts, with analyses by a long-established and respected German laboratory. Sampling (at 12 surface water points) and analyses were done in accordance with European and German standard procedures. Key conclusions were:



- No evidence of "undue high concentrations of cyanide and toxic elements in surface water"
- "The concentration of elements and cyanide in waste water are significantly below the limits of the German Ordinance on Waste Water."
- Elevated concentrations of certain parameters indicate further research is needed, but for the Kumtor River downstream, "do not represent a hazard for humans"

We invite you to visit the full report, which is posted on Kumtor's website, and review also Kumtor's Annual Environmental Reports and other publications.





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Kumtor welcomes your comments and questions about this brochure and all related activities. Please direct your communication by e-mail to: environment@ kumtor.com or contact Kumtor's Offices or Information Centers:

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ABOUT THIS BROCHURE

In this brochure, we explain how drinking water and wastewater are treated with modern technologies to ensure safety for our employees, the environment and downstream communities. This is one of a series of brochures.

ABOUT KUMTOR

Kumtor open-pit gold mine is one of the world's highest, its operations lying between 3600 and 4400 metres above sea level, in a partially glaciated permafrost zone. Gold production began in 1997, with planned completion in 2026. Approximately one-third of mine-operator Centerra Gold Inc. is owned by Kyrgyz Republic state-owned enterprise, Kyrgyzaltyn.

OUR COMMITMENT

Our highest corporate priorities include the health and safety of our employees, contractors and the public, combined with effective environmental management systems, as detailed in our policy statement and Annual Environmental Reports posted each year at www.kumtor.kg. This includes our commitment that waste water, both industrial and sanitary, is subject to a high level of treatment before being discharged into the Kumtor River.

WATER QUALITY MANAGEMENT AT KUMTOR

Water management is an integral and significant part of our operations. We are committed to limiting impacts to accepted levels in Kyrgyz laws and also international best practice. We achieve this through careful monitoring and management of water use and quality. Wherever necessary, effluents are treated prior to discharge. The key components of water quality management are:

- Providing safe drinking water for our employees.
 Capturing our industrial and sanitary wastewater
- Capturing our industrial and sanitary wastewater and treating it to a high quality that meets national and international standards.
- Monitoring of treated water at discharge points and downstream both internally and through internationally accredited external laboratories
- Reporting water quality data for public and regulator review

WHERE WE USE WATER

As already published in a separate brochure entitled "Kumtor and Water Management", most of the water we use is pumped from Petrov Lake, a natural glacier lake at the foot of the Petrov Glacier. On average we divert only 5% of the total outflow from Petrov Lake. Most of this water use (97%) is for ore processing in the mill. The remaining volume (3%) is for domestic and sanitary uses at the mine camp.

WHERE OUR WATER GOES

Approximately 83% of water used is non-consumptive. This means it is returned to the Kumtor River. Wastewater from the mill is piped to, and stored within the Tailings Management Facility (TMF). During the summer, when Kumtor River is not frozen, effluents from the TMF are pumped to an Effluent Treatment Plant (ETP) before discharge to the Kumtor River. Sanitary wastewater is treated at a separate Sewage Treatment Plant (STP) prior to discharge into a holding pond, before being discharged to the Kumtor River during the summer months. We closely monitor the water quality in the Kumtor River immediately downstream of the mine for compliance with Kyrgyz and international standards.

WATER QUALITY STANDARDS

Wastewater is treated to meet maximum allowable discharge (MAD) concentrations for surface water, as required by our ecological permits. There is a MAD for treated effluent and one for treated sewage, both applicable at the point of discharge. Our discharge water quality criteria also

include those provided by applicable Canadian standards and IFC guidelines.

At the request of the Kyrgyz Government sponsored Commissions, an independent sampling exercise was completed in 2012 by German experts who compared water quality results with relevant European water quality standards. The samples collected were analysed by a German laboratory and all results have been published by Kumtor on its website (see also Independent Survey section below).

CONTAINMENT

Wastewater is transported in closed pipelines and held in contained facilities for release when conditions are suitable. Industrial wastewater is retained within the TMF contained by a synthetically lined dam to prevent leakage. Wastewater at the sewage treatment plant (STP) is managed and stored within lined tanks, and discharged after treatment into a holding pond prior to release to the Kumtor River during the summer months.

WATER TREATMENT

For drinking water, water from Petrov Lake is treated at the potable water treatment plant (PWTP) by methods that are standard for many public supplies around the world. These include flocculation, filtration, carbon filtration, chlorination and UV treatment - which in combination remove large and fi ne particles and disinfect.

For our industrial wastewater, the main quality concern of the public is typically associated with cyanide. This chemical is used in the processing and recovery of gold from the ore. Cyanide can be toxic to fish and wildlife at elevated concentrations.

The first stage of treatment of cyanide-containing industrial effluent occurs naturally. This is from the action of the Sun's ultra-violet light on the TMF surface, which speeds up the natural degradation of cyanide.

Subsequently, wastewater is pumped to the effluent treatment plant (ETP) where it is treated using the INCO patented method, a commonly used process in gold mines worldwide. Using this method, the wastewater passes through three lined pits, the first for cyanide destruction, the second for metals removal and the third for final polishing, settlement of solids and storage prior to licensed discharge of treated water. The solid waste is collected when required and returned to the TMF.

For sanitary wastewater or sewage, the main concern is the removal of organic matter, which could use up oxygen in the natural water courses (biochemical oxygen demand or BOD). This is achieved with biological treatment in a 'digester'. This process uses bacteria to break down organic matter. On discharge, the water



is also chlorinated to kill potentially harmful bacteria. Although challenging at such high altitudes with relatively low atmospheric oxygen and harsh weather conditions, treatment is achieved successfully through careful systems design and management.

MONITORING & SAMPLING

Monitoring is one of the most important aspects of environmental management, providing data to show if water management and treatments are working as intended. Regular monitoring provides an early warning, making it possible to resolve potential problems before they become serious.

Monitoring is the responsibility of our own environmental team. Each year, over 9,000 samples of air, soil and water are collected at our mine site, as detailed further in a separate brochure entitled "Kumtor and Environmental Monitoring". We give special attention to surface water monitoring. Drinking water quality is tested twice daily.

Duplicate samples are often sent to separate labs in Kyrgyzstan and Canada to validate the accuracy of results.

Government representatives also independently collect water samples for analysis. This is typically conducted before treated water is allowed to be discharged to the Kumtor River.

For surface water, there are over 15 regular sampling points, including upstream of mining (to monitor back-

ground reference), before and after water treatment plants, and at important points downstream of mining. These include the point known as the 'Compliance Point' or 'End of Mixing Zone' (EMZ). Routine monitoring continues about 230 km downstream of the mine, to a location about 2 km upstream of the town of Naryn. Kumtor has recently entered into an agreement with Naryn State University for their independent collection and review of the water quality samples in Naryn.

Water quality is tested daily at the ETP (when operational during the summer) and at the STP discharges.

