Industrial

Water management in a copper and gold mine

Southern Gobi Desert, Mongolia

water scarcity impact

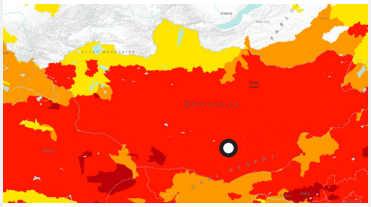
Reduced withdrawal	●
Reduced consumption	●
Improved water quality	
Increased productivity	
Net basin benefit	●

volumetric impact
28 038 000 m^3/yr

capital cost
$56 720 000

estimated unit cost of water
15 ¢/m^3

Water Stress
Southern Gobi Desert, Mongolia



Arid & low water use
Low (<10%)
Low to med (10-20%)
Med to high (20-40%)
High (40-80%)
Extremely high (>80%)
No data available

Water Stress Map:
F. Gassert, P. Reig, T. Shiao, M. Luck and M. Landis, 2015. "Aqueduct Global Maps 2.1."

Confidence level
Low Medium High

Water Scarcity Impact Key
Main Minor

Credits
We would like to acknowledge Mark Newby of Oyu Tolgoi mine and Rebecca Darling and Arjun Bhalla of IFC for their input in the preparation of this case study.

Project Overview

Oyu Tolgoi (OT) is one of the world's largest copper-gold deposits located in the Gobi Desert, Mongolia. Rio Tinto, the multi-national metals and mining corporation, have a 66% ownership stake in, whilst the Mongolian Government owns 34%. Once fully operational, the mine could increase Mongolia's GDP by 35% by 2020.

The Southern Gobi Region has little to no surface water. In order to maximise productivity in this water stressed environment, the mine have installed extensive water reuse systems, highly efficient tailings, zero/low water use equipment and floating lagoon covers to reduce evaporative losses.

The negative perception of the mining industry in the region is being tackled through the formation of the South Gobi Water and Mining Industry Roundtable. The mine have been able to share their good water management practices, as well as effective community engagement strategies, with other mines in the region in order to promote good practice across the industry.

Key Elements

- Stakeholder engagement through the South Gobi Water and Mining Industry Roundtable convened by the IFC.
- 100% water re-use within the mine.
- Floating cover on raw water storage lagoon to reduce evaporative losses.
- Legislation increasing the groundwater abstraction charge from $0.08 per m^3 to $0.5 per m^3.
- Minimised water usage throughout the process, for example air cooled incinerators
- Maximised re-use and reclamation of process water.

Key Outcomes

- When benchmarked against industry standards the mine has reduced its water withdrawal by approximately 28 000,000 m^3/year
- A reduction in open water evaporation of approximately 79 000 m^3/yr
- Water use per tonne of ore produced is less than half the global average for typical copper-gold mines.
- A raw water use rate of 696 l/s against a licence to abstract 870 l/s.
- More than 100 local wells rehabilitated for use by the local population.

Southern Gobi Desert, Mongolia

Intervention Features

¬ Wastewater reuse in mines ¬ Stakeholder engagement ¬ Wastewater recycling for industrial use

Project Levers

(1) Community pressure

Since the early 2000's, competing demands for scarce water resources, coupled with a series of pollution incidents caused by mining activity, have led to various disputes between local communities and the mining industry, including campaigns and petitions. In order to be granted a licence the mine had to prove that they would have no adverse effect on the accessibility of groundwater to local communities.

(2) Water legislation

Water abstraction law was revised in 2012 requiring users to obtain a water permit in order to withdraw groundwater.

Abstraction costs were also increased from $0.08 per m^3 to $0.5 per m^3, an increase of 625%. Following extensive hydrogeological surveying, the mine identified a brackish aquifer 35 km north of the mine. The Ministry of Environment granted a license to abstract 870 liters per second from the Gunii Hooloi aquifer for 40 years, an estimated 20% of the aquifers capacity. The high cost of abstraction provided a major driver to reduce usage by 174 liters per second from the quota defined by the Mongolian Government, a saving of approximately $2 750 000.

(3) Stakeholder engagement

The lasting legacy of distrust amongst the local population for the mining industry is being tackled through the South Gobi Water and Mining Industry Roundtable, convened by the IFC.

The aim is to increase information sharing, engagement with communities, as well as promoting and sharing good practice across the industry. This includes the development of an industry code of conduct as well as a training module for Integrated Water Resource Management designed for the companies as well as broader stakeholder groups.

In addition, a population perceptions baseline survey on the impact of mining activities on water resources was designed. Data will be made public so that mining activities and stakeholder perceptions are aligned.

(4) Water use reduction technologies

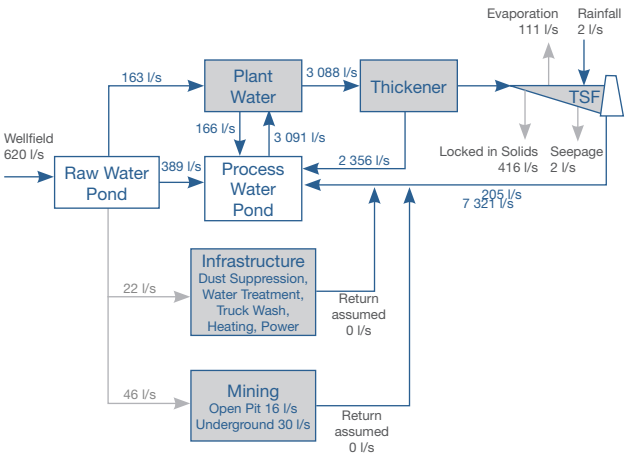
The mine employed several interventions to reduce its water use. These included:

- high efficiency tailings thickeners.
- reuse of recovered cooling water.
- recovery of treated site effluent.
- utilisation of air cooled incinerators.
- floating covers on raw water storage lagoon to reduce evaporation.

Outcomes and Challenges

76% of the reduction in water use achieved by OT is as a result of high-efficiency thickeners used to reclaim water from the mixture of process water and ground rock that remain after ore extraction.

Competition for water resources has also been reduced through the mine investing $1 500 000 on the rehabilitation of over 100 local shallow wells. This has improved the water security of local herders and reduced tensions between the two groups. A further $1 900 000 has also been invested in community infrastructure projects such as sports facilities in local towns and the construction and maintenance of the local road network.



Above: Process flow diagram