WATERCARE MINING

Case Study:

The CoolQuench

Potable, Chilled Drinking Water, Independent of Capital-Intense Water Reticulation Systems

Remote sites, including underground mine environments, have no potable water for workers to drink and workers have to carry their drinking water to their place of work. As a result, the volume of available drinking water is limited by the amount the worker can carry, and is often only sufficient for part of the day. Watercare Mining applied its expertise and knowledge of large-scale industrial water treatment plants, to the design and manufacture of a containerised water plant, the CoolQuench, to treat the complex, non-potable water available at the remote underground mining site, to SANS- and WHO-compliant drinking water.

The CoolQuench Q15C, has been installed and commissioned at an underground gold mine in Gauteng. A health and safety standard developed by the mine requires eight litres of drinking water to be made available to each miner. To achieve this, the mine was required to install municipal-grade potable water pipes to all underground working areas, including the stopes at each level. Considering that this mine has five mining levels, with working areas to the east and west of the shaft, extending approximately two kilometres to the working stopes, installation of a municipal water reticulation system presented a prohibitive capital outlay for the mine.

A further concern was the misuse of municipal potable water at working surfaces where such water is available. It has been observed that underground potable water is used for purposes other than drinking, such as the washing of the surrounding work environment and personal protective equipment (PPE), or is wasted through faulty manifolds and pipelines. A case study highlighted a worst-case scenario, where the water consumption measured per employee was two hundred litres per day.

FIGURE 2: THE COOLQUENCH WATER TREATMENT PLANT

The CoolQuench reliably and consistently provides SANS 241 potable, chilled water for workers in the remote mine working areas. Its working process encompasses multiple water

FIGURE 1: THE FLOW OF WATER THROUGH A COOLQUENCH UNIT

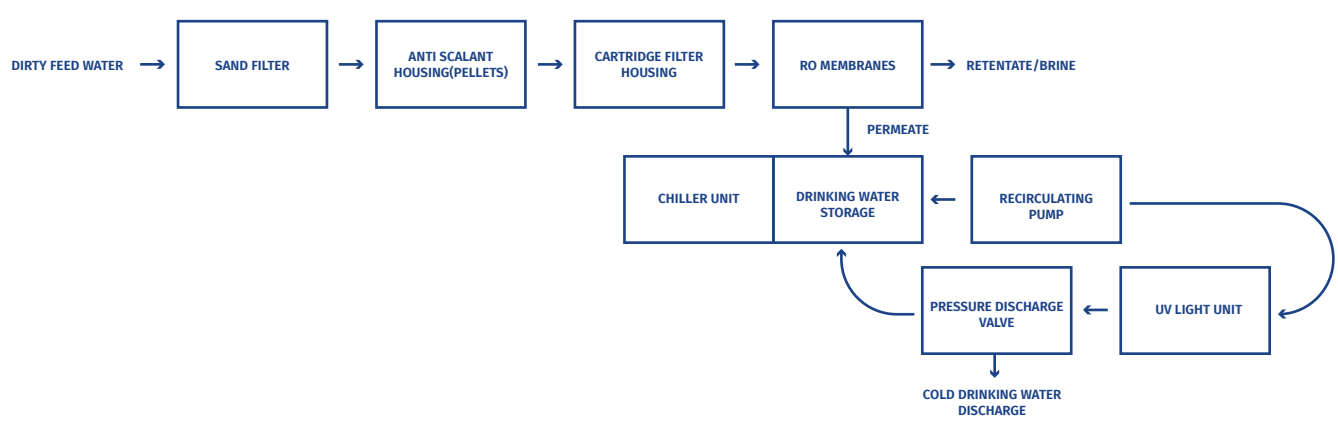

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TABLE I: A COMPARISON OF THE COST OF PROVIDING UNDERGROUND MINE WORKERS WITH COOLQUENCH-TREATED WATER VS MUNICIPALLY-TREATED WATER.

	EMPLOYEES	CONSUMPTION (l/DAY)	R/m³	R/EMPLOYEE/MONTH	TOTAL MONTHLY COST FOR THE MINE
CoolQuench (Q15)	1875	8	R17,77	R4,27	R8 000
Municipal	1875	50	R15,97	R23,96	R45 000
Municipal	1875	100	R15,97	R47,91	R90 000
Municipal	1875	200	R15,97	R95,82	R180 000

purification steps: the feed water is treated by a sand and cartridge filter to remove suspended solids, before passing through a reverse osmosis membrane to remove dissolved salts and heavy metals. The treated water may, if required, be chilled to 8 – 10 degrees Celsius. A circulating pump passes the treated water through UV radiation to remove microbial contamination. The potable water is available for discharge as cold drinking water.

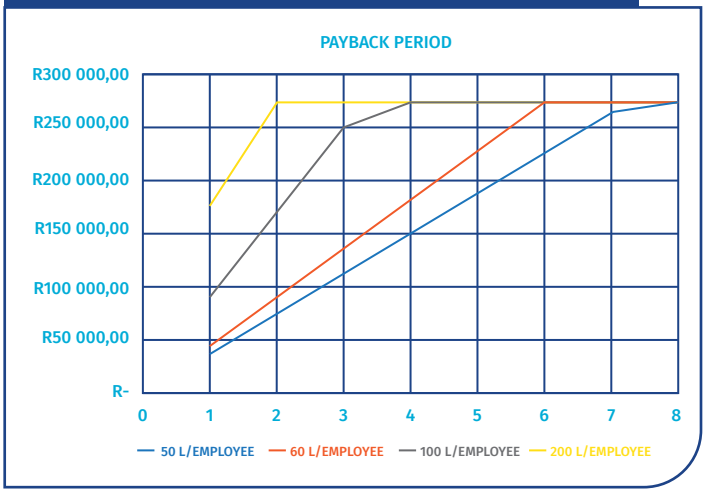
Watercare Mining manufactures a range of CoolQuench sizes with a range of treatment capacities from 5 000l/day to 15 000l/day. The units are either 1m or 2m wide (depending on the production capacity), 0.7m deep and 1.7m high. This represents a very small footprint. The weight varies between 350kg and 520kg. An operating pressure of 6.5 to 12 bar, and 220V of power is required for operation. The construction materials are corrosion-resistant for hygiene, robustness and longevity. Watercare Mining has installed seven surface and five underground CoolQuench units.

Customer ROI

The CoolQuench Q15C, producing 15m3/day of potable water, provides 1 875 employees with 8l of SANS 241 quality drinking water per day. Table II shows a comparison of the cost of providing municipal potable water to the workers, ranging from water consumption of 50l to 200l per worker per day. CoolQuench-treated water is 11,2% more expensive than municipal supply, per produced unit volume. The total monthly cost, considering the potential waste, varies from 5 to 21 times higher than Coolquench treated water (Table I).

The tabulated savings enabled the mine to realise a short payback period, of between 2 and 7 months, on their investment in the Coolquench unit. Figure 2 shows a comparison of the payback period, considering the range of municipal water utilisation.

FIGURE 3: A COMPARISON OF THE COOLQUENCH PAYBACK PERIOD (MONTHS) FOR A RANGE OF MUNICIPAL WATER UTILISATION PER EMPLOYEE



The CoolQuench has been a cost-effective alternative to a reticulated municipal water supply system, providing the following benefits

- The avoidance of capital-intensive potable water reticulation systems
- The prevention of potable water misuse
- A decrease on regional water reliance
- Safe drinking water supply for remote work areas
- No excavation requirement for the installation of the equipment
- Improved working conditions