CASE STUDY

REPUBLIC STEEL'S COOLING TOWER

INDUSTRY
STEEL MILL
APPLICATION
COOLING TOWER
WATER SOURCE
BLACK RIVER, OH
YEAR INSTALLED
2015



INTRODUCTION & PROCESS DESCRIPTION

Water is often a hidden cost of industrial sites and can contribute significantly to operational costs. Cooling towers are used to reject heat through the natural process of evaporation providing cooled water across a broad range of applications. Due to evaporative losses, the water remaining in the cooling tower becomes concentrated with dissolved solids that will lead to scaling and corrosion.

The traditional methods of scale and corrosion control are through dosing chemicals and blowdown - the act of discharging water at a high TDS level. This operation results in high volumes of water and chemicals being discharged to the environment. The quality of the water introduced to the cooling tower system is key to the efficiency of this process and the frequency of preventive maintenance intervals.

For this site, the Black River was the only viable water source. Republic Steel evaluated and rejected traditional and membrane treatment methods due to high operational costs and overall effectiveness on the water source.

VOLTEA'S CAPDI SOLUTION

Republic Steel selected Voltea's CapDI model IS36 as it required minimal pretreatment. With low energy consumption and minimal intervention, the forecasted operational costs were lower than any other technology evaluated. The customer's need for high quality water (lowest controlled TDS level) led to the selection and use of CapDI to treat river water as the feed source at this location.



PROVEN RESULTS

Installed at the beginning of the spring season, the CapDI system experienced extreme fluctuations in feed water quality. The run-off of salts from the local area at the end of winter resulted in the Black River conductivity varying between 400 and 1400 µS/cm, corresponding to 23 to 180 ppm chlorides with turbidity spiking up to 800 NTU. Despite the seasonal changes in feed water quality, the CapDI system operated after a simple conventional multi-media filtration. Average chloride, sulfate and phosphate levels were significantly above the targets set by the cooling tower manufacturer. Voltea's CapDI system was set to a fixed ion removal to meet the water requirements. The level of chloride ions in the treated water was decreased by 77%, and the concentration of sulfate and phosphate ions was reduced by 67%. Hardness and conductivity was reduced by 78% and 62% respectively.

ABOUT VOLTEA

Voltea's award-winning tunable desalination technology, CapDI© (Membrane Capacitive Deionization), desalinates brackish water at a lower economic and environmental cost than any other available technology. CapDI is a simple and innovative way to remove dissolved salts from water.

Voltea's CapDI technology is scalable and helps consumers and industry reduce water usage and save money.



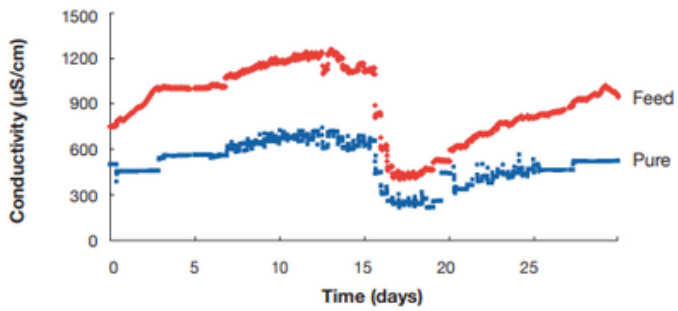




CAPDI PERFORMANCE RESULT

SYSTEM CONDUCTIVITY

The system operation was improved by the implementation of dynamic control on the CapDI system, allowing it to constantly monitor and adjust performance. One month of continuously monitored data is shown in Figure 1.



Feed and pure water conductivity treated by CapDI

The use of CapDI technology with minimal pretreatment allowed Republic Steel to use a feed water source previously deemed unfit for the cooling tower. Additionally, the chemical free process enabled the site to discharge the concentrated effluent of the CapDI system directly into the river without having to secure an additional site permit for disposal.

WATER QUALITY*

Parameter	Avg. Black River	Requirements	Product Water
Chloride (ppm)	98.5	<50	22.5
Sulfate (ppm)	97.5	<50	32.5
Phosphate (ppm)	0.3	<0.2	0.1
Conductivity (µS/cm)	800.0	N/A	305.0
Hardness (ppm as CaCO3)	132.5	N/A	29.2

*Test data independently provided by CWM Environment Inc.

Voltea Water Inc.
1920 Hutton Court #300 Farmers Branch, TX 75234
info@voltea.com