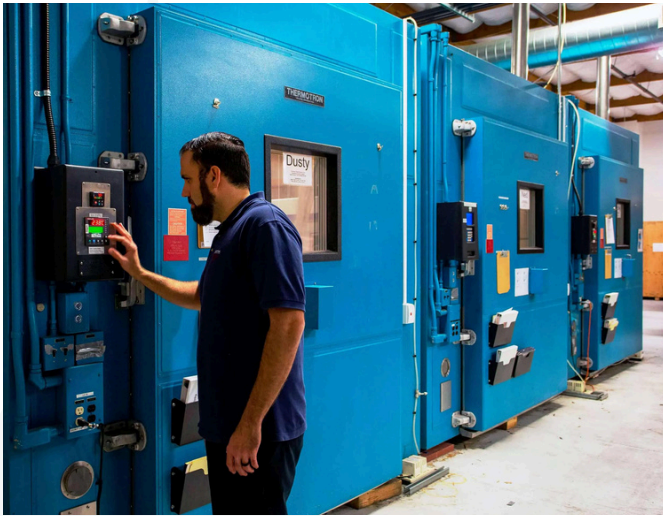


WESTPAK SAN DIEGO

COMMERCIAL TEST LABORATORY



OVERVIEW

Westpak is a 3rd party, independent test laboratory specializing in services such as product reliability testing, accelerated aging, and package testing. Serving essential industries such as biotech, pharmaceutical, military, and electronics for over 30 years, Westpak has grown to become one of the leading test laboratories in the United States' production, pharmaceutical, and defense industries.

The San Diego facility's cooling system is mission-critical to the provision of these services. If the cooling system were to operate at reduced efficiencies due to poor system control, these tests would be at risk of being compromised and severely impact Westpak's core business.

The cooling system consists of two fluid coolers that provide chilled water to the testing processes. Westpak has entrusted the optimization and service of this system to Capture H₂O since 2012.

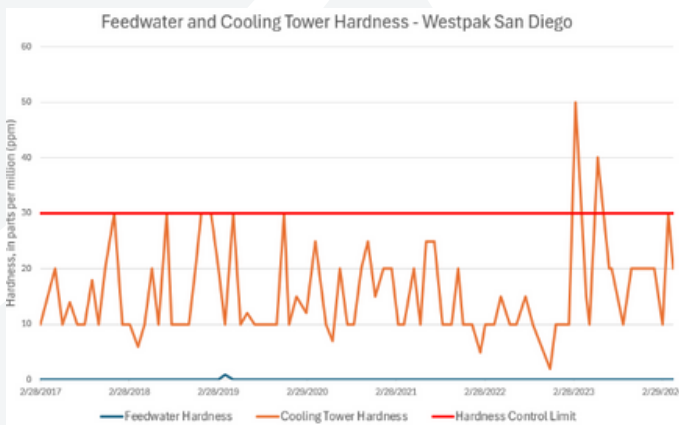
IMPLEMENTATION

Make up water conductivity (metric for mineral content in water) at the Westpak San Diego site has been, on average, 867 uS since February 2017. Due to the extreme hardness and overall mineral content in San Diego's potable water, cooling towers usually operate at two cycles of concentration (CoC) in the region on a traditional liquid chemical program. CoC is how concentrated the cooling tower water is relative to the potable makeup water via evaporation, as well as the ratio of makeup to blow down water. In other words, 50% of the water being supplied to the cooling tower is being blown down to the drain at two CoC. Westpak San Diego was not content with this inefficient and wasteful use of water and looked to Capture H₂O for innovative and sustainable solutions.

WESTPAK SAN DIEGO

ENERGY SAVINGS

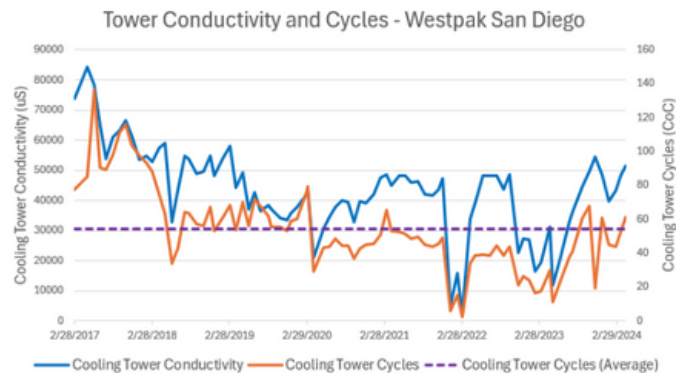
Westpak San Diego opted into the Capture H₂O High Cycle Program. This program utilizes dual alternating, high-efficiency softeners installed on the makeup line to the fluid coolers to control the scaling minerals calcium and magnesium. Due to optimal system design, high-quality service, and attention to detail from both the Westpak and Capture H₂O teams, hardness has been kept to 1 ppm or lower in the feed water to the towers and an average of 15 ppm in the tower from February 2017 to January 2024.



What does this mean for Westpak San Diego? **Significant energy savings.** It is estimated that every eggshell's width of scale leads to 12% energy loss. With minimal scaling minerals in the feed and tower water, the cooling system operates in an energy efficient manner.

WATER SAVINGS

With the scale addressed by the softeners and not a scaling inhibitor that loses effectiveness at higher CoC, the Capture H₂O High Cycle Program allows Westpak San Diego to reduce blowdown and increase CoC, resulting in **significant water savings.** Since February 2017, the water in the cooling system has had an average conductivity of 43,200 uS, corresponding to an average of 54 cycles of concentration.



Remember that the average cycles of concentration in San Diego is two, (50% blowdown). At 54 CoC, Westpak San Diego is blowing down only **1.8%** of the makeup water. This is a **48.2%** reduction in water consumption and a **96.4%** reduction in blowdown to the drain.

WESTPAK SAN DIEGO

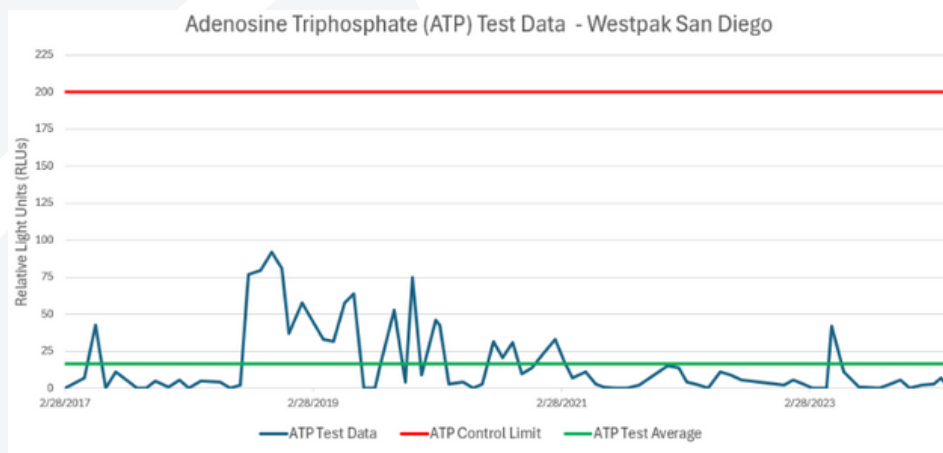
BACTERIA CONTROL

When blowdown is reduced, the remaining minerals concentrate in the tower water as the fluid cooler evaporates the pure water. This concentration of minerals creates two natural, bacteria-killing phenomena: osmotic pressure from concentration of minerals (like salting meat) and high pH (like fermenting a cucumber into a pickle). This is called a biostatic environment and is a hostile environment for bacteria created naturally without the use of biocides.

This is validated by the adenosine triphosphate (ATP) and Legionella Pneumophila test data below. ATP is a molecule that serves as the primary energy source in cells. Both ATP and Legionella tests are the industry standard for bacteria testing. The control range for ATP is considered 200 Relative Light Units (RLUs) or less.

Why is this important? Firstly, bacteria can be harmful to humans, especially in the form of Legionella Pneumophila, or Legionnaire’s Disease. This is contracted from inhaling aerosolized water droplets – a common occurrence in cooling water – that are infected with the disease. The second reason is bacteria, algae, and biofilm growth can lead to both heat transfer inhibition and energy loss, just like scale. The lower the ATP count, the more efficient the system is operating.

Since February 2017, Westpak San Diego has had an average of 16.93 rlus with a maximum of 92 rlus and zero positive Legionella tests, well within the control range.



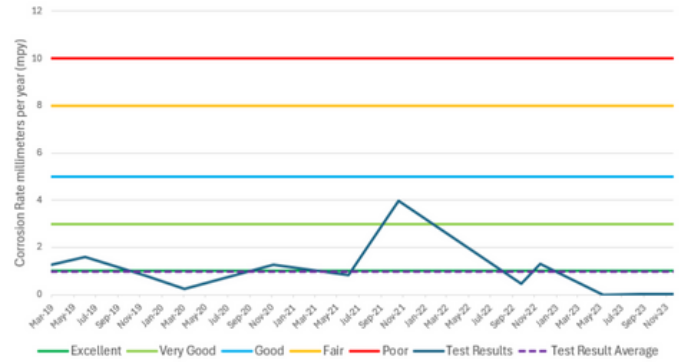
WESTPAK SAN DIEGO

CORROSION CONTROL

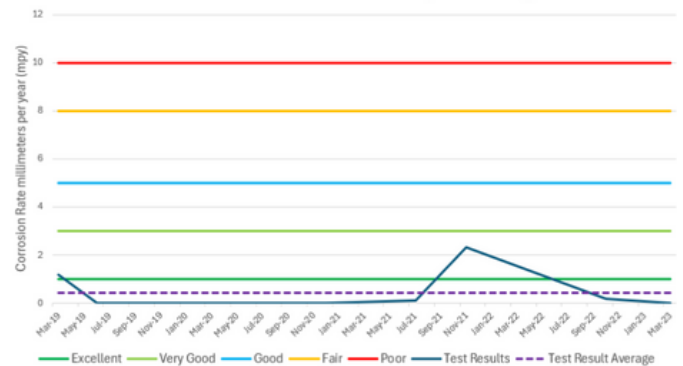
The concentrated mineral content in the soft tower water and the elevated pH allows Westpak San Diego to utilize silica, a naturally occurring mineral in water, for corrosion protection. In this environment, silica converts from a monomer to a polymer and forms a microscopic layer on the wetted equipment, protecting it from corrosion with having to feed virtually zero corrosion inhibitors.

As shown in the corrosion coupon data analyzed over this period, Westpak was able to create an environment that controlled corrosion for the galvanized, mild steel and copper metals in the system while feeding virtually zero corrosion inhibitors.

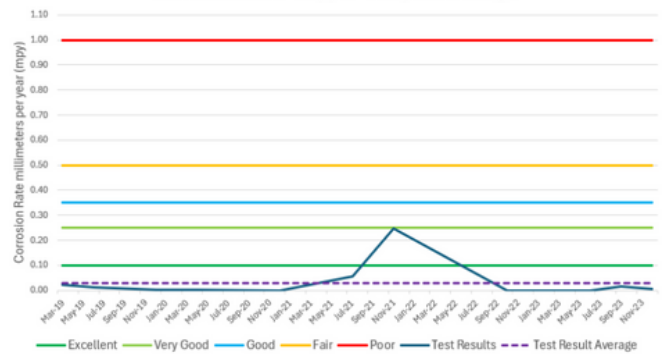
Corrosion Rates - Galvanized Steel - Westpak San Diego



Corrosion Rates - Mild Steel - Westpak San Diego



Corrosion Rates - Copper - Westpak San Diego



SUMMARY...

Westpak San Diego is a model site for cooling water innovation and leadership. The Capture H₂O High Cycle Program has led to a 96% reduction in blowdown, significant chemical consumption reduction, and tremendous system control.

“We have been very pleased with the Capture H₂O High Cycle Program and the Capture H₂O Service Team. Water scarcity is a concern in California and this program has helped us do our part.”

- **Shane Ferguson, Westpak Facilities Manager**



CAPTURE
H₂O

Find out how Capture H₂O can help your business shift to a more sustainable, cost-effective water treatment program at captureh2o.com

Return on Investment

It is difficult to measure the energy savings due to excellent scale and bacteria control or the avoided capital expenses due to excellent corrosion control. However, calculating the cost savings associated with reduced water consumption is very straightforward.

Assuming Westpak San Diego would run at approximately two cycles of concentration on a traditional chemical program, the Capture H₂O High Cycle Program has a

**44-month
payback on
water savings
alone.**