

PROCESS WATER

ENVIROTOWER™ COOLING TOWERS WATER TREATMENT AT MEDVAMC



The EnviroTower system allowed operator to cycle up the water system saving over 12% water and eliminated need of hazardous chemicals by over 92%.

Michael E. DeBakey Veterans Affairs Medical Center (MEDVAMC) is a care facility affiliated with the United States Department of Veterans Affairs in the Texas Medical Center in Houston, Texas, United States. It is operated by the United States Department of Veterans Affairs. The hospital is one of the Veterans Affairs largest hospitals, serving Harris County and 27 surrounding counties, located on a 118 acre (48 ha) campus since 1945. www.scalebuster.com

Michael E. DeBakey VA Medical Center serves as the primary health care provider for almost 13,000 veterans from all over the country. In addition to R&D, MEDVAMC provides specialized diagnostic care, radiation therapy, surgery, and medical treatment, including cardiovascular surgery, gastrointestinal endoscopy, nuclear medicine, ophthalmology, and treatment of spinal cord injury and diseases.

Challenge

The HVAC cooling water treatment has been the traditional chemical cocktail dosed into the water to prevent scale, corrosion and biological growth. The cooling system required a lot of maintenance, the cost of chemicals was high, scale build up was common (causing excessive energy costs, a lot of water waste and more maintenance involving health and safety concerns as well as extra cost), oxidizers required routine rotation, bio-growth was present periodically and the hazardous materials in the mechanical room was a concern of health and safety.

The first EnviroTower system based on the ION ScaleBuster technology treating the cooling tower water of the HVAC system was installed in the mechanical room of one of the buildings of the medical centre back in 2008. The system was designed as a side stream running water through a ScaleBuster SB80 (3') conditioner as well as a cyclonic separator which removed the precipitated hardness particles and a control system that controls the blow down valve according to the water conductivity.

Results

The results of the HVAC water treatment were so good, that in 2014 another EnviroTower system was ordered to treat a 2,800 ton HVAC system following by another (for 7,000 ton HVAC) early in 2015, enabling the medical center of savings of chemicals, energy, water and labor. The EnviroTower system allowed the operator to cycle up the water system (saving over 12% water), kept the system clean of scale (preventing the need for excess energy, saving over 10%

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CTS Skid

vs. previous years) and corrosion (saving over 87% on maintenance hours and material) and most important, eliminated the need of hazardous chemicals, by over 92%.

The customer's testimony was very straight forward, "The patented EnviroTower and the ScaleBuster technologies completely replaced the traditional chemical water treatment, providing control of scale and corrosion in our HVAC water systems and maintained an exceptionally clean system with no signs of scale or corrosion or bio-

growth. This dramatically reduced energy and water consumption, while eliminating toxic water discharge to the environment. The satisfaction from this solution had lead us to order 2 more EnviroTower systems to a large 2,800 ton HVAC system and a new larger 7,000 Ton HVAC system in 2014-2015".

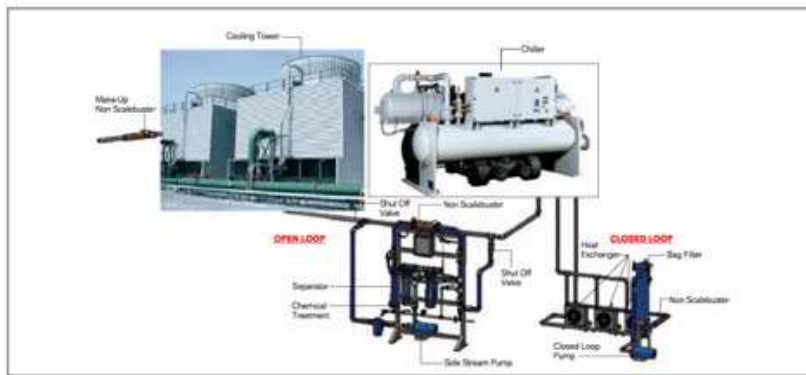
ScaleBuster® - Physical Water Conditioning Technology

The patented ScaleBuster technology (ISB®) can completely replace traditional chemical

treatment of certain cooling systems, providing control of scale and corrosion in various water process systems to create an exceptionally clean system. This dramatically reduces energy and water consumption, while reducing or, in certain cases, eliminating toxic water discharge to the environment.

How Does it Work?

Once the ISB is installed into the system the calcium and magnesium are precipitated into suspension. These particles remain within the flow



Open-Closed Loop Assembly



Scalebuster Group Shot

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VA Houston Medical Center

of the water. When these particles reach the hot parts of the system the tendency to adhere to the hot surfaces is dramatically reduced. Therefore the ScaleBuster protects the equipment from potential limestone damage. The ISB is conceived to make the particles formed non-adherent. After installation of the ISB, limestone is mainly present in the form of aragonite, which is a non-adherent crystalline structure contrary to the untreated calcite that can cause deterioration and damage in unprotected systems.

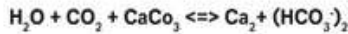
- » Rather than preventing precipitation of salts, our proprietary device which is a physical conditioner works using a proprietary mechanism which forces the precipitation of these salts.
- » Crystals nucleate with non-binding geometry pass through a system with minimal adhesion to the surfaces.
- » In a multi-pass system, the particles build on each other with each pass through the conditioner until they are large enough to be either removed via a hydro-cyclone separator or other filtration methods.
- » Once the salts are precipitated and/or removed, they present a significantly lower danger of reducing efficiencies.
- » Water becomes more aggressive (under saturated) and gently "eats" existing lime scale as water is a perfect solute.



Cooling Tower

How Does Hardness Get into Water and How Does it Come Out Again?

The dominant components of super molecular structure of any ground or spring water are calcium (Ca²⁺) and hydrogen carbonate (HCO₃⁻) ions which result from the decomposition of calcium carbonate (CaCO₃) according to the following simple equation:



The hardness of water increases with the number of these ions.

Based on the same but reversed equation, hard water can be softened by separating calcium back to its solid phase (CaCO₃). This process occurs, for example, in boiling hard water. The well known incrustation is formed at the phase interface and suspension is formed in the liquid phase at a greater distance from the phase interface.

Water softening requires a certain amount of power, either heat power, mechanical power, or electric power. The lowest consumption, and therefore the highest efficiency of CaCO₃ separation is achieved by electric power, which



Control Skid Front View

makes it possible to reverse the course of the mentioned reaction. The quantity of electric power must be however sufficient to maintain the thermodynamic water balance.

Types of hardness in water are:

- » Temporary hardness is caused by the presence of dissolved carbonate minerals (calcium carbonate and magnesium carbonate). When dissolved, these minerals yield calcium and magnesium cations (Ca²⁺, Mg²⁺) and carbonate and bicarbonate anions (CO₃²⁻, HCO₃⁻). The presence of the metal cations makes the water hard. However, unlike the permanent hardness caused by sulfate and chloride compounds, this temporary hardness can be reduced either by boiling the water, or through the process of lime softening. Boiling promotes the formation of carbonate from the bicarbonate and precipitates calcium carbonate out of solution, leaving water that is softer upon cooling.
- » Permanent hardness is hardness (mineral content) that cannot be removed by boiling. When this is the case, it is usually caused by the presence of calcium and magnesium sulphates and/or chlorides in the water, which become more soluble as the temperature increases. Despite the name, the hardness of the water can be easily removed using a water softener, or ion exchange column.

About the Author

Jonathan Gur (M.Sc. Engineering, Brunel University, London UK) is the CEO and President of ION Enterprises. He has been involved in the water sector for over 25 years and held management and executive positions with some global companies.

ION Enterprises Limited has been trading since 1990, manufacturing a range of environmental water treatment devices under the trademarks of ScaleBuster® and ISB®. Over the past years their technology has been installed by many well-known global companies with excellent results. Our products have been applied into more than 3,00,000 applications to date.

To know more about the author & contributor of this case study, you can write to us. Your feedback is welcome and should be sent at: mayur@eawater.com. Published letters will get a 1-year complimentary subscription of EverythingAboutWater Magazine.