

**Chardon Laboratories, Inc.**



## **Special Activity Report**

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**Date:** August 4, 2022  
**Contact Type:** On-Site Visit  
**Chardon Contact:** David Schofield  
**Customer:** The DEVON  
**Customer Contact:** MS Christina Peronti  
Mr. Hank Maier  
Mr. Gary Morris  
**Subject:** Cooling Tower Control and Feed Equipment

Once again, I would first like to thank you for choosing Chardon Laboratories to manage your water treatment program.

The following report outlines the concerns and recommendations that came from our site visit on Wednesday January 18.

### **1. Water Softener for the Facility Hot Water System.**

After our discussions, I contacted Hank to discuss further. The main concern was the water specifications listed on page 30, which lists a hardness limit of 9 ppm, or 0.5 grains.

This limit is for a Condensing system that produces steam, which your system does not. Your system is a hot water system that does just that, circulates hot water.

It is the opinion of myself and Chardon Laboratories that a Water Softener is Not Required. This would be an unnecessary expense and continued added maintenance and salt costs.

The issue with the system failure was biological and had no connection to hardness.

## 2. Hot Water System Failure

1. As we discussed, the recent system failure was the result of improper treatment and biological fouling with significantly high bacteria levels.

The sample I pulled last June, tested POSITIVE for SRB within only 65 hours, revealing a high presence of biological fouling.

Often referred to as MIC, Microbiologically Influenced Corrosion occurs when one or more species of bacteria colonize and begin feeding on the iron surfaces in a system. Colonies can attack all types of ferrous metals including iron, mild steel, galvanized and stainless steel. The metabolic process of Sulfate Reducing Bacteria (SRB) uses the conversion of iron to iron oxide to create energy. *Galionella* also converts iron to iron oxide. *Clostridium* excretes hydrogen ions which react with water to form strong organic acids. The common result is pits in the surface of the metal that are hidden under tubercles of iron oxide.



**Leaking Tubes in Heat Loop**

I strongly recommend that this system be properly flushed and cleaned followed by a proper chemical treatment program.

***This Procedure Has Not been Performed***

After careful review and talking with Gary, we estimate the **Total System Volume** to be **3,348 gallons.**

**(800' of 10" Piping / 3,264 g / 120' of 4" Piping / 79 g / 400' of ½" Piping / 5 g)**

We discussed having Gary start the flushing of the system immediately to start the cleaning procedure. We need to be sure that the bleed does Not Exceed the Make-up water. We are looking to slowly flush the system, not drain it.

As discussed, this will take days to complete. With the system volume of 3,348 gallons, we may actually bleed 12-15,000 gallons of water.

**NOTE:** The CHILLED side of the system is in operation and is what I sampled that resulted in the Positive IRB analysis.

This procedure may need to be performed again once we switch to the HEAT side of the system. Even with that side currently drained, the IRB is what caused the pitting and is most likely still present in the Heat system.

Begin by flushing the system at a rate of 1-2 gallons per minute from a valve at a low point in the system. It is important to monitor the pressure on the circulating pump during this stage. If the flushing rate exceeds the make-up rate, the system volume will drop and the pump will cavitate. This can cause expensive damage to the pump bearings and impellor. By making sure the pressure is maintained in the system, you ensure that the pump will not run dry. Continue flushing until the water consistently runs clear and free of iron and copper. Depending on the volume in the loop, this may take as long as 5-7 days. Count on approximately 18 hours of flushing for every 1,000 gallon in the loop.

Once the water is clear, add the following products to the system.

<b>Char Clean</b>	<b>1qt per 1,000 gallons</b>
<b>Char Prep</b>	<b>5 gallons per 1,000 gallons</b>
<b>Biocide</b>	<b>16 ounces per 1,000 gallons</b>

Circulate this cleaning solution for at least 48 hours. Circulate for 96 hours in heavily fouled systems.

After the cleaning period, flush the loop using the guidelines in the first step. Continue flushing until the conductivity of the water in the loop equals that of the make-up water.

Retreat with the appropriate closed loop treatment and add 16 ounces of Biocide per 1,000 gallons of water in the loop as a bacteriostat.

The system has a make-up water meter in place that is currently not being recorded. This is vital and extremely useful information. Chardon will track and record the actual water usage to assure that the system remains tight and consistent.

### **Additional Services**

Dual Loop Flush and Cleaning Procedure	\$950.00 per 1,000 gallons
System Volume @ 3,500 gallons	\$3,325.00 per cleaning procedure

## Cooling Tower



**BAC 500 Ton Cooling Tower**  
**Estimated System Volume = 2,916 gallons**  
**Sump 8' X 16' / 480' of 10" Piping**

The cooling tower sump was heavily fouled with algae, both dead and alive with significant biological build-up on the tower fill.

I strongly recommend a complete system decontamination procedure be performed immediately, followed by a proper physical cleaning as soon as it can be scheduled.



**Tower Sump with Significant Biological Fouling**



**Tower Fill with Heavy Build-up**

**Total Physical Cleaning of Cooling Tower is Required  
BEFORE Seasonal Start up**

**NOTE:** We did perform a full Tower Decontamination Procedure to shock the system and kill the existing bacteria and biological fouling.

TOWERCHLOR 56, was added to the system to bring the chlorine residual to < 90 ppm.  
(Normally Raise to 60 ppm, but with the Minimal Bleed Ongoing, Raised to 90 ppm)

The system was operated with full circulation, along with minimal bleed and normal operation.

Chardon Laboratories product: TOWERCHLORÒ 56 GRANULES

Component	Percentage	CAS Number
Sodium dichloroisocyanurate dihydrate	98 - 100	51580-86-0
Sodium Chloride	0.1 - 1	7647-14-5

### Additional Services

Physical Cooling Tower Cleaning	\$2,400.00* <b>*Actual Cost May Vary Due to Current Tower Conditions. Further Inspection of the Inside the Tower Sump will be Required to Provide Accurate Cleaning Pricing</b>
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We also discussed upgrading the cooling tower system controller. The current cooling tower controller was not operating properly and needed to be calibrated and programmed. The first issue was that the controller needed a Password entered to allow us to make adjustments.

After six phone calls, I was finally able to get a technician from the manufacturer to supply us with a factory over-ride code that allowed us access.

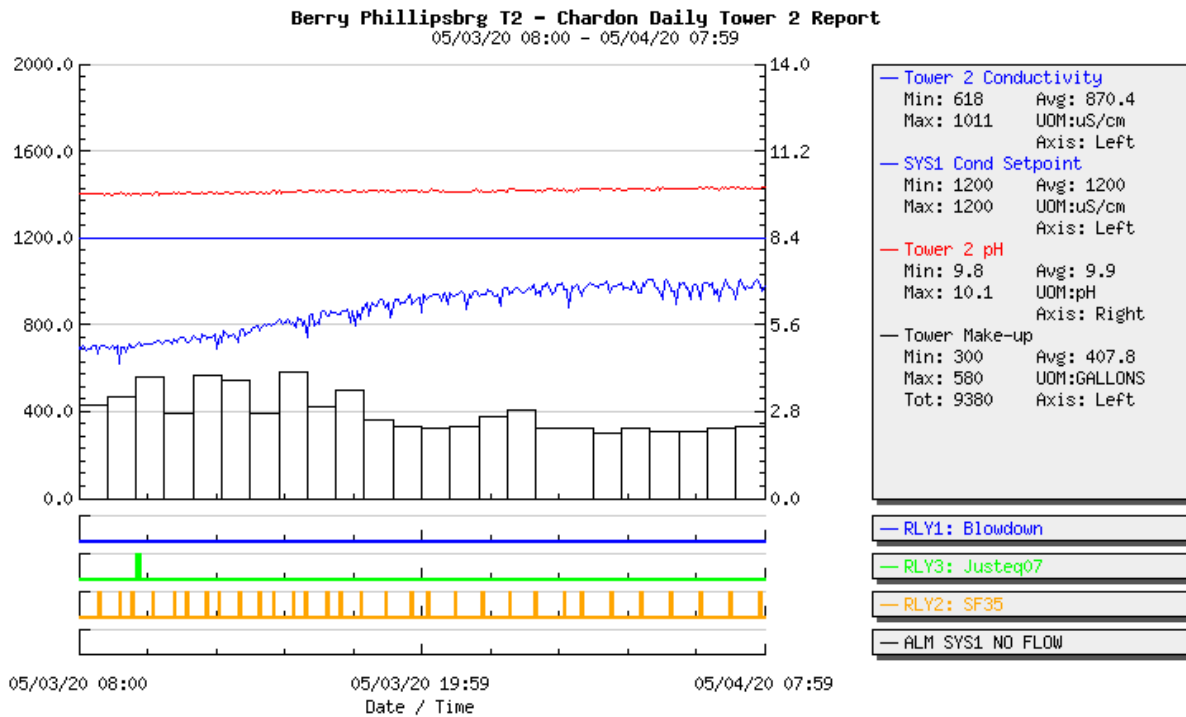
We were able to get into the system programming, which was quite disarrayed, and get the calibration and feed times set correctly. As we serviced the system last summer, the issues were reoccurring and required additional service time to get corrected.

I recommend upgrading the system to an Advantage Megatron Controller. These advanced micro-processors control every function required, with Water Meter Inputs, Chemical Feed Timers, Flow and Bleed Control.

The Advantage Controller comes equipped with Remote Monitoring capabilities. Chardon's exclusive Remm-Com Monitoring System maintains communication with your system 24 hours a day. It will deliver multiple alarms, such as no-flow, low-flow high and low levels and more. Rem-Com will also produce daily reports and graphs that are delivered directly to your e-mail and smart phones. Chardon can even make adjustment to the settings from our control center for quick and easy response to any changes in operations.

This would require an intranet connection or  
The purchase of a cell phone router (\$850.00).

**All alarms, Reports and 24/7 Monitoring is Provided at No Additional Costs.**



**Sample of Daily Remm-Comm Report**

Advantage XCSF4-E12H Controller	\$2,295.00
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If you have any questions, or require additional information, please feel free to contact me. I may be reached any time, via my cell phone, at 215-527-9007, or on the web at [dschofield@chardonlabs.com](mailto:dschofield@chardonlabs.com).

I am also available to meet on site at any time with notice.

Sincerely,

David Schofield

*Chardon Laboratories, Proud Members of:*

