Case Study - Hotel Cooling Tower
Scale and Bio

Updated on January7, 2014

Installer:
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Customer:
Marriott Koolina Beach Club, Oahu, Hawaii, USA.

Application:
500 Ton Cooling Tower.

Installed unit:
*Hydro*FLOW Custom 14" water conditioner on a cast iron pipe feeding the chillers.

Water source:
Calcium Carbonate hardness of roughly 200 ppm and Silica hardness of roughly 50 ppm.

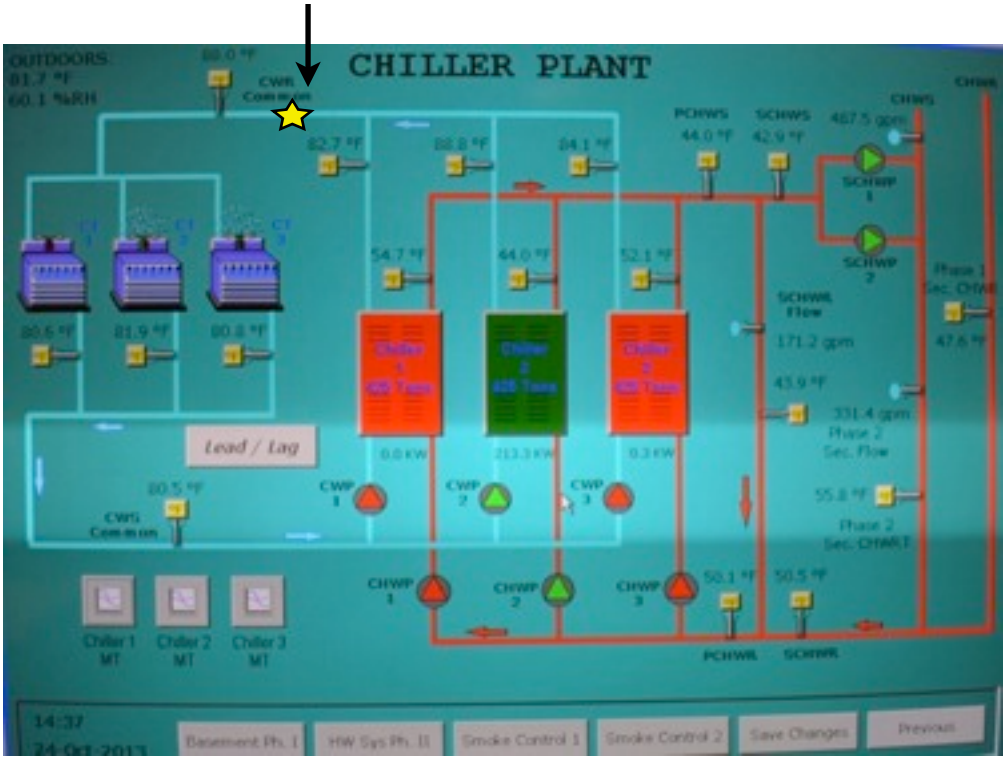
Installation date:
September 10, 2013.

Success factors:
- Reduce chemical usage by up to 75% while keeping the cooling tower readings within acceptable parameters.
- Significantly reduce maintenance costs.
- Reduce blow down water usage by up to 75%.

Note: Cooling tower with small amounts of scale, corrosion and biofilm accumulation. The goal is to maintain these conditions while using reduced amounts of chemicals and water.

System diagram and installation point:

***Hydro*FLOW Water Conditioner**



Installed *Hydro*FLOW water conditioner:

One of the 3 chillers:

Total bacteria count in the tower's recirculating water:

Baseline measurement with 100% biocide (under 1,000 CFU)

Biocide chemicals kept CFU levels at a minimum

After 1.5 months with 50% less biocide (between 1,000 to 5,000 CFU)

Slight raise in CFU count as *Hydro*FLOW began to remove biofilm from the cooling tower

After 3 months with 75% less biocide (under 1,000 CFU)

CFU count reduced back to under 1,000 CFU

NANO TEKON
RESTORE PROTECT MAINTAIN

Blow down water consumption:

Date	Conductivity	pH	Chemical reduction	Blow down rate
Sep. 10, 2013 (Baseline)	1,560 µS	9.0	100% Anti-scalant & Anti-corrosive 100% Biocide	1 gallon every 10 seconds
Sep. 24, 2013	1,562 µS	9.0	50% less Anti-scalant & Anti-corrosive 100% Biocide	1 gallon every 10 seconds
Oct. 24, 2013	1,264 µS	9.0	No Anti-scalant & Anti-corrosive 50% less Biocide	1 gallon every 10 seconds
Nov. 14, 2013*	1,082 µS	9.0	No Anti-scalant & Anti-corrosive 75% less Biocide	1 gallon every 12 seconds
Nov. 21, 2013*	1,371 µS	9.0	No Anti-scalant & Anti-corrosive 75% less Biocide	1 gallon every 13 seconds
Dec. 3, 2013*	1,449 µS	9.0	No Anti-scalant & Anti-corrosive 75% less Biocide	1 gallon every 16 seconds
Dec. 17, 2013*	1,636 µS	9.0	No Anti-scalant & Anti-corrosive 75% less Biocide	1 gallon every 20 seconds
Jan. 7, 2014*	2,064 µS	9.0	No Anti-scalant & Anti-corrosive 75% less Biocide	1 gallon every 30 seconds

* Prior to the installation of *Hydro*FLOW, the conductivity of the cooling tower was maintained at roughly 1,500 µS via constant blow down (opened drain valve). The goal was to maintain conductivity between 1,500 to 1,800 µS while reducing water usage by up to 50% and keeping the cooling tower free of scale accumulation.

Note: Since the automatic blow down mechanism was not operational, blow down was reduced by slightly closing the valve every 1-2 weeks.

Other readings:

Iron - Fluctuated between 0.00 to 0.07.
Alkalinity - Started at 240. One week after *Hydro*FLOW was installed it reduced to 180 and remained at that value.
Nitrate - Fluctuated between 560 to 640.

Results:

1. Lime scale accumulation stopped as soon as *Hydro*FLOW was installed.
2. Anti-scalant and Anti-corrosive were completely discontinued after 1.5 months.
3. Existing scale and biofilm deposits were gradually removed.
4. After reducing the biocide by 75%, the total bacteria counts continued to be minimal.
5. Blow down was reduced by 75%. *Note: Blow down can be reduced further with 10% side stream filtration.*
6. Efficiency of chillers was maintained (no scale and biofilm accumulation in chiller tubes).
7. Under one year Return on Investment (ROI).

One Year Cost Savings Analysis			
	Before *Hydro*FLOW	**After *Hydro*FLOW**	**Savings**
Electricity	$148,997	$141,547	$7,450
Blow down (make up and sewage water costs)	$59,067	$14,767	$44,300
Chemicals	$7,000	$1,750	$5,250
Maintenance	$2,000	$1,000	$1,000
Total	**$217,064**	**$159,064**	**$58,000**