Crossflow microsand filtration in cooling tower systems: A sustainable approach to control fouling in heat exchanger devices

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Figure 1.S Pilot study circuit

Table 1.S Specifications of the hospital building plate heat exchanger sampled for this study

Table 2.S Physicochemical characteristics of the recirculating water inside the circuit measured through bi-weekly sampling at the purge (Figure 1) from April 2022 to May 2023, prior to HX cleaning.

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Table 1.S Specifications of the hospital building plate heat exchanger sampled for this study

Brand	Armstrong (Model: S-48-1250-81)
Material	Zinc plated stainless steel 304
Size	29.5” x 62.8”
Gasket material	NBR-glued
Surface per unit (ft^2)	503.62
No. of plates	81
Heat exchanged (Btu/h)	4931697
Fluid circulated (gpm)	1300 gpm, 1100 gpm
LMTD (^oF)	7.68
Design pressure (PSI)	150
Plate thickness (mm)	0.6
Design temperature (^oF)	210

Table 2.S Physicochemical characteristics of the recirculating water inside the circuit measured through bi-weekly sampling at the purge (Figure 1) from April 2022 to May 2023, prior to HX cleaning. Values given in the parenthesis are minimum and maximum observed values during this study.

Parameters	**Unit**	**Onsite HX** **Mean values* ± SD (min-max)** **n=20**
Temperature	°C	22.7 ± 2.0 (17.9-27.5)
pH	pH units	8.5 ± 0.2 (7.9-8.9)
Conductivity	µS/cm	694 ± 226 (365-1146)
Free chlorine	mg/L	0.48 ± 0.99 (0 – 4.3)
Total chlorine	mg/L	0.68 ± 1.19 (0 – 4.9)
Total dissolved solids	mg/L	458 ± 149 (241-960)
Total suspended solids	mg/L	1.3 ± 1.5 (0.0-9.2)
Total alkalinity	mg/L as $CaCO_3$	198 ± 7.1 (98-345)
Dissolved oxygen	mg/L	9.0 ± 0.6 (8.3-11.2)
Chloride	mg Cl^-/L	69 ± 31 (27-119)
Sulphate	mg SO_4^{2-} /L	44 ± 20 (19-89)
Phosphate	mg PO_4^{3-} /L	1.9 ± 3.1 (0.2-19)
Calcium	mg Ca^{2+} /L	66 ± 24 (25-133)
Magnesium	mg Mg^{2+} /L	24 ± 13 (6-49)

*SD: standard deviation;
n = number of measurements;