



Moss Briefs:

LSI and ProMoss™

Does LSI Predict Scaling or Corrosion in ProMoss Treated Water Systems?

Common questions:

- Does ProMoss™ affect the LSI?
- Should I be concerned if the LSI becomes positive or negative while on ProMoss™?
- Are there any examples of LSI being predictive of scale formation on ProMoss™?

What is the Langlier Saturation Index (LSI)?

The LSI is a simple calculation developed by a boiler engineer to try and predict whether calcium will form scale or water will become corrosive. It is based on the false assumption that all scale formation is due only to saturation and that the water is in direct contact with the metallic surface.

It is easy to use, simple to calculate, is used by chemical companies and water treatment companies to predict scale or corrosion and monitor their treatment plans.

Does it work?

In an idealized, laboratory controlled situation it works for calcium carbonate scaling. In the real world it is not predictive because there are many types of scale other than calcium carbonate, scale formation has a biologic component, and corrosion is predominately a biologic phenomena.

Does ProMoss™ affect the LSI?

Yes

- ProMoss™ slightly acidifies the water
- ProMoss™ lowers calcium concentration by removing calcium ions from the water resulting in a positive LSI



Should I be concerned if the LSI becomes positive or negative while on ProMoss™?

No

- ProMoss™ inhibits and removes scale formation by promoting flocculation and absorbing positively charged ions from the water.
- ProMoss™ inhibits organic contamination formation that acts as a nucleation site for microscopic crystal formation and glues the crystals together to form scale.
- ProMoss™ inhibits corrosion as shown in Fig.1 and 2 as evidenced by measurements of corrosivity and corrosion products by removing and inhibiting the formation of organic contamination that contributes to MIC.

Corrosivity was measured for mild steel using linear polarization probes

Mild Steel Corrosivity (North)

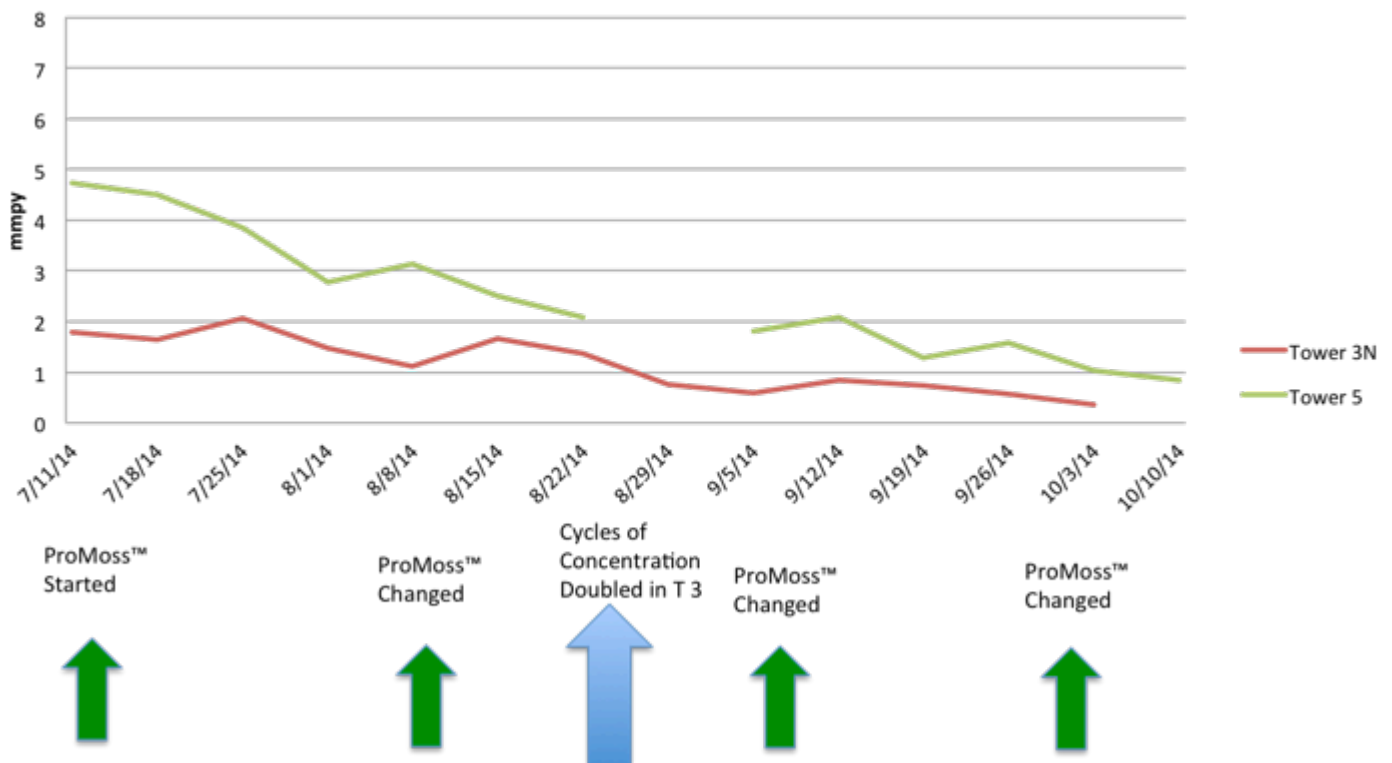


Figure 1. The ProMoss™ treated tower is in red, the control tower is in green. Tower 3N has ProMoss™ and chemicals - Tower 5 has chemicals only.

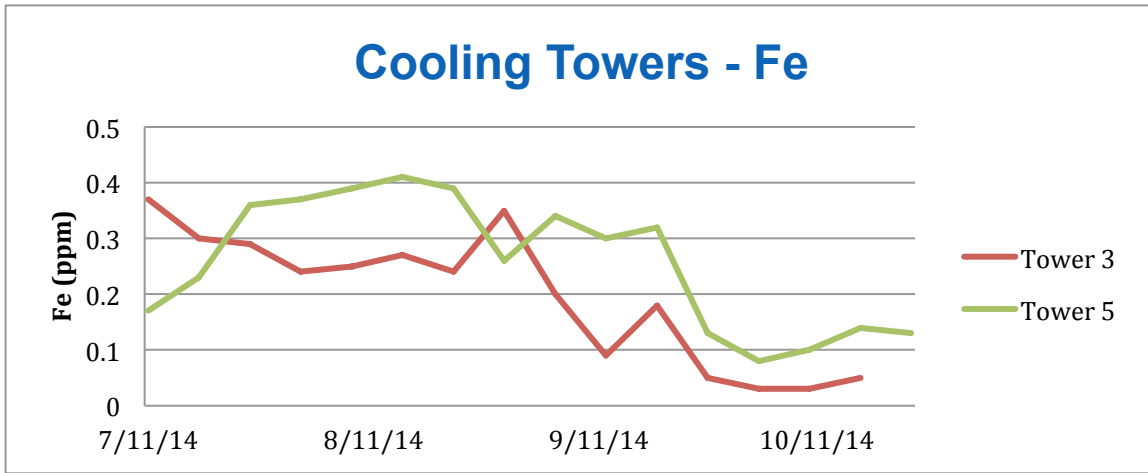


Figure 2. Corrosivity and products of corrosion were decreased in the ProMoss™ treated tower even when the cycles of concentration were doubled (on 8/29/14).

Are there any examples of LSI being predictive of scale formation on ProMoss™?

Many – here's one

- 3M used ProMoss™ along with their chemical program at their corporate headquarters. The LSI became positive over the summer
- Towards the middle of the summer the water treatment company sent an email to 3M concerning the LSI of +2 as shown in Fig.3. They predicted that the chiller was scaling due to lower calcium levels and positive LSI. No changes in treatment were made
- The chiller was opened at the end of the cooling season for cleaning as shown in Fig.4 and 5

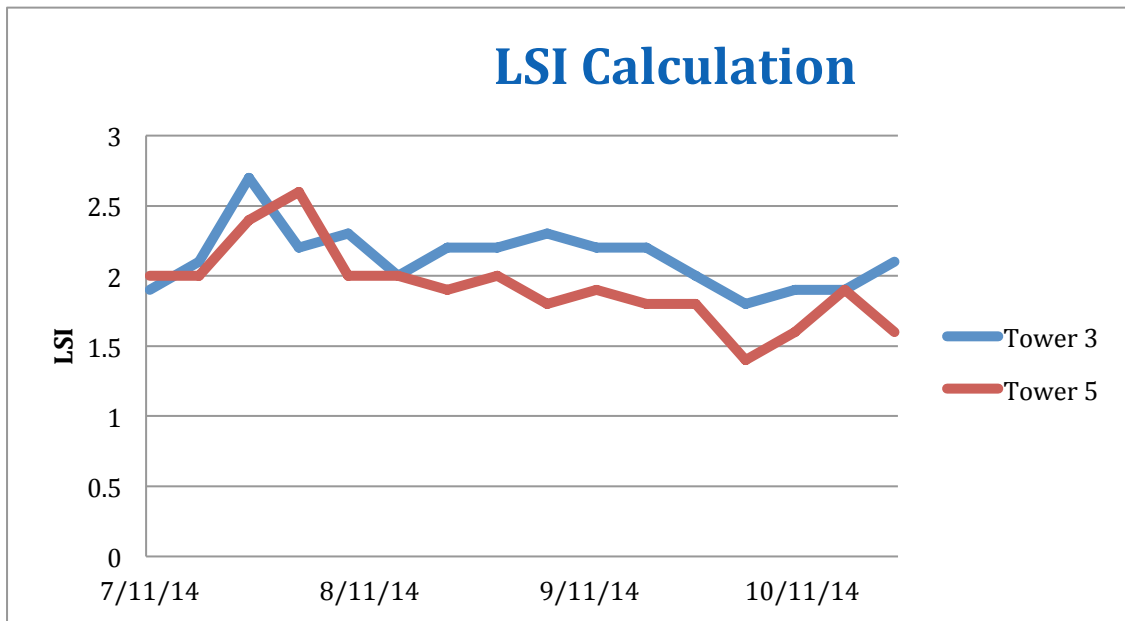


Figure 3. Tower 3 has ProMoss™ and chemicals - Tower 5 has chemicals only.



Figure 4. Chiller treated with ProMoss™ after opening with no cleaning

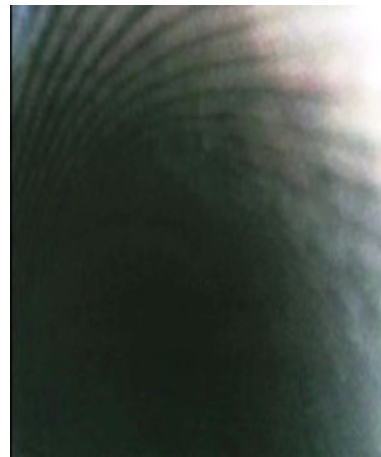


Figure 5. The only visible scale formation was on the zinc anodes. Scoping the tubes showed no scale or corrosion. The scale was analyzed and was zinc oxide.

Conclusions

LSI is not predictive of scale or corrosion in ProMoss™ treated cooling towers.

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