

Hevasure Report for [REDACTED]
[REDACTED], Plymouth,
1 August 2019 – 24th September 2019

Continuous monitoring of the LTHW system.

Prepared for:

[REDACTED]

Prepared By:

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24/09/2019

1. SYSTEM DETAILS

Site	██████████, Plymouth
Client	██
System Type	LTHW
Volume	TBC
Installation date	TBD
Commencement of monitoring	30/05/2019
Number of floors	TBC
Location of monitoring system	Plant Room
Materials	Carbon steel, Non-barrier plastic, brass fittings, copper?
Inhibitor	None

2. MANAGEMENT SUMMARY AND RECOMMENDATIONS

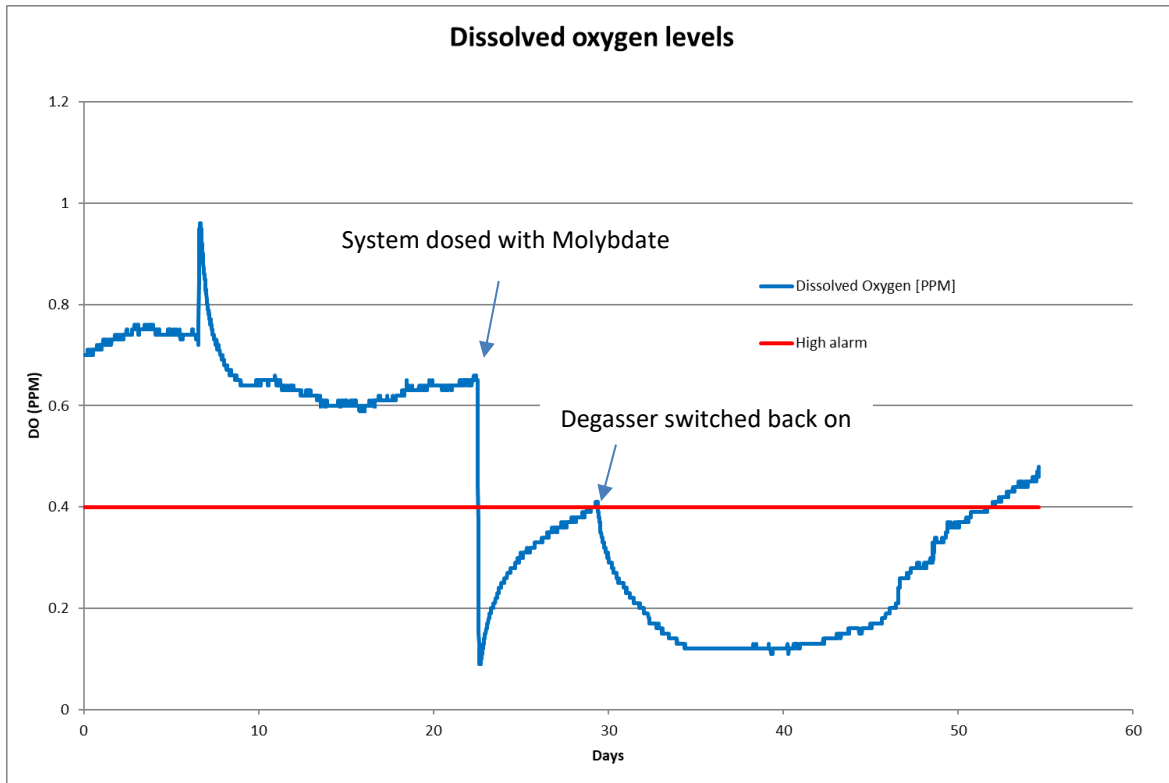
This report covers a period of monitoring system at ██████████ from 1 August 2019 through to 24 September 2019. The level and variations in each key parameter are detailed in the following pages and the findings summarised below:

The LTHW system at ██████████ has previously suffered from high levels of corrosion brought about by excessive oxygenation. Recent activities (such as adding inhibitor and switching on the vacuum degasser) have brought this under control. Galvanic currents have now dropped to virtually zero and the outer wire of the crevice corrosion sensor is still intact. However, dissolved oxygen levels have now started to rise again which could be explained if the degasser is no longer operational. This needs to be checked out and rectified if appropriate.

Oxygen ingress is believed to be through non-barrier plastic pipework installed in the system. Pressure is high and stable and therefore can be ruled-out as a cause of DO.

3. LTHW SYSTEM - KEY PERFORMANCE INDICATORS AND TRENDS

Dissolved Oxygen

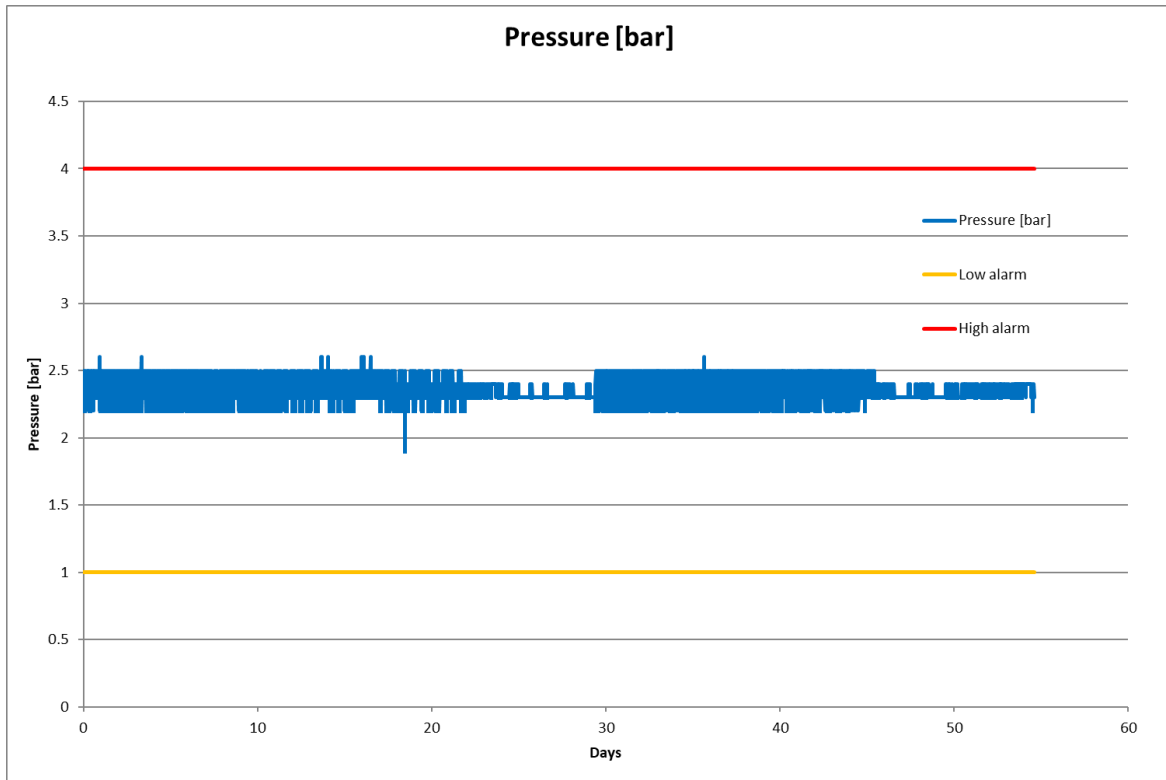


Comment: Dissolved oxygen has been too high for much of this period with large variations. It is difficult to explain why adding Molybdate inhibitor on the 23rd of August could have had such a significant effect (on reducing DO levels). After all, Molybdate inhibitors do not scavenge oxygen from water. It can only be surmised that by adding chemicals to the system some other system changes occurred.

What is easier to explain is the drop in dissolved oxygen that occurred on the 30th August, which coincided with the SpiroVent degasser being switched back on. This clearly had a beneficial effect. However, dissolved oxygen started to rise again after a few days, which would be explainable if the degasser was switched off again. This needs to be investigated and confirmed.

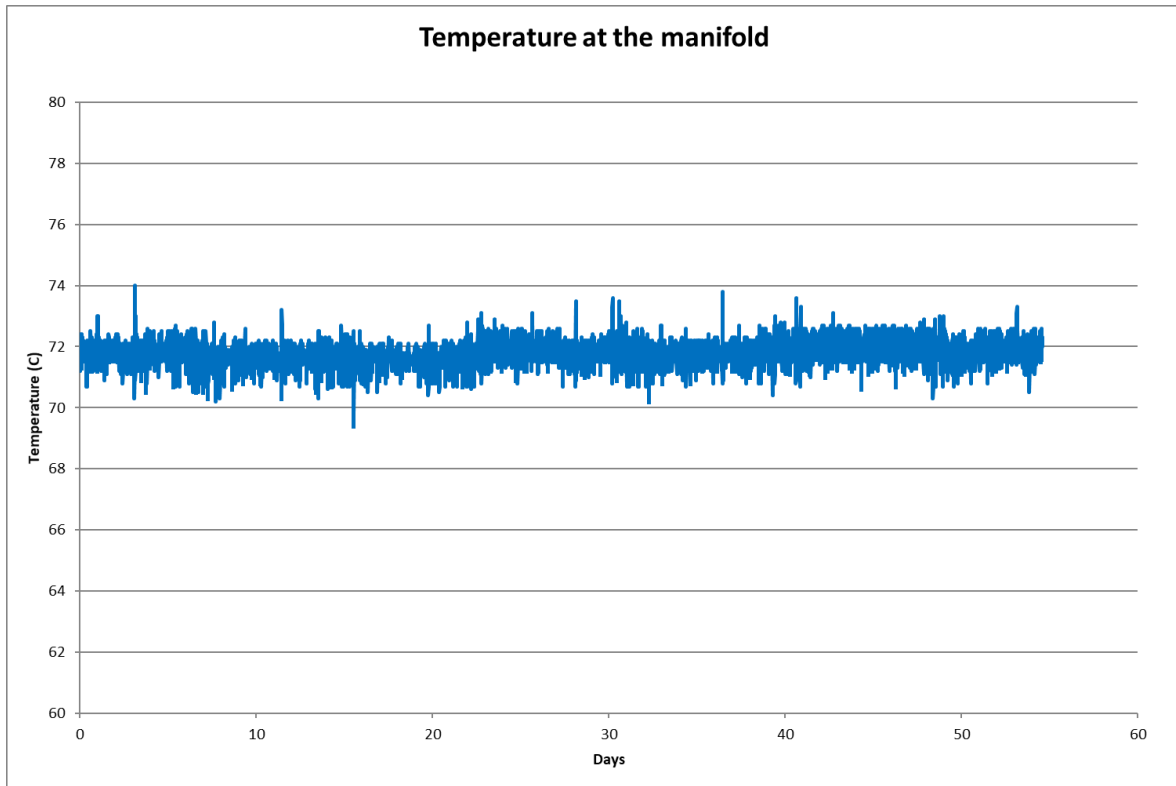
Dissolved oxygen levels are now back at over 0.4 mg/L (ppm) which is too high.

Pressure



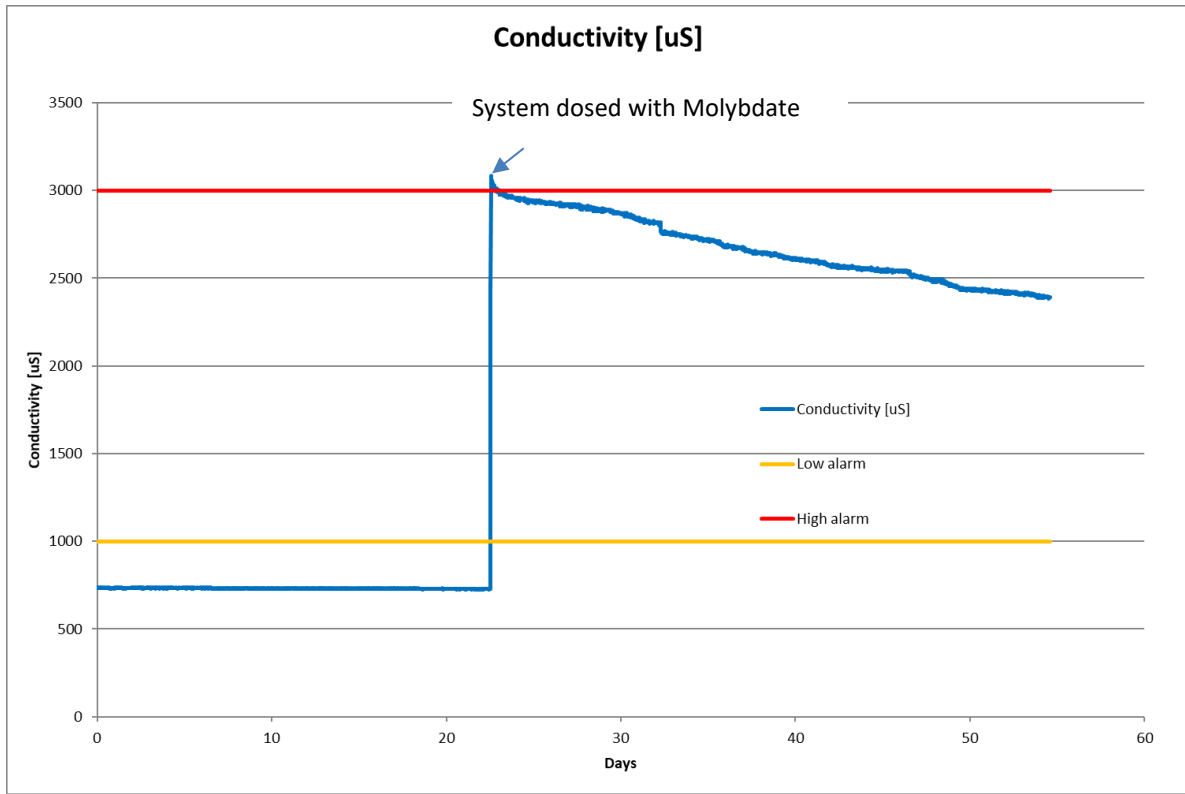
Comment: Pressure in the LTHW system as measured in the manifold has remained positive and fairly stable throughout the monitoring period at between 2.2 and 2.5 bar. This therefore would not be a contributory factor to the high dissolved oxygen found in the system.

Temperature



Comment: The temperature in the LTHW system (as measured at the manifold) has been fairly stable throughout the monitoring period, between about 70 and 73 Celsius.

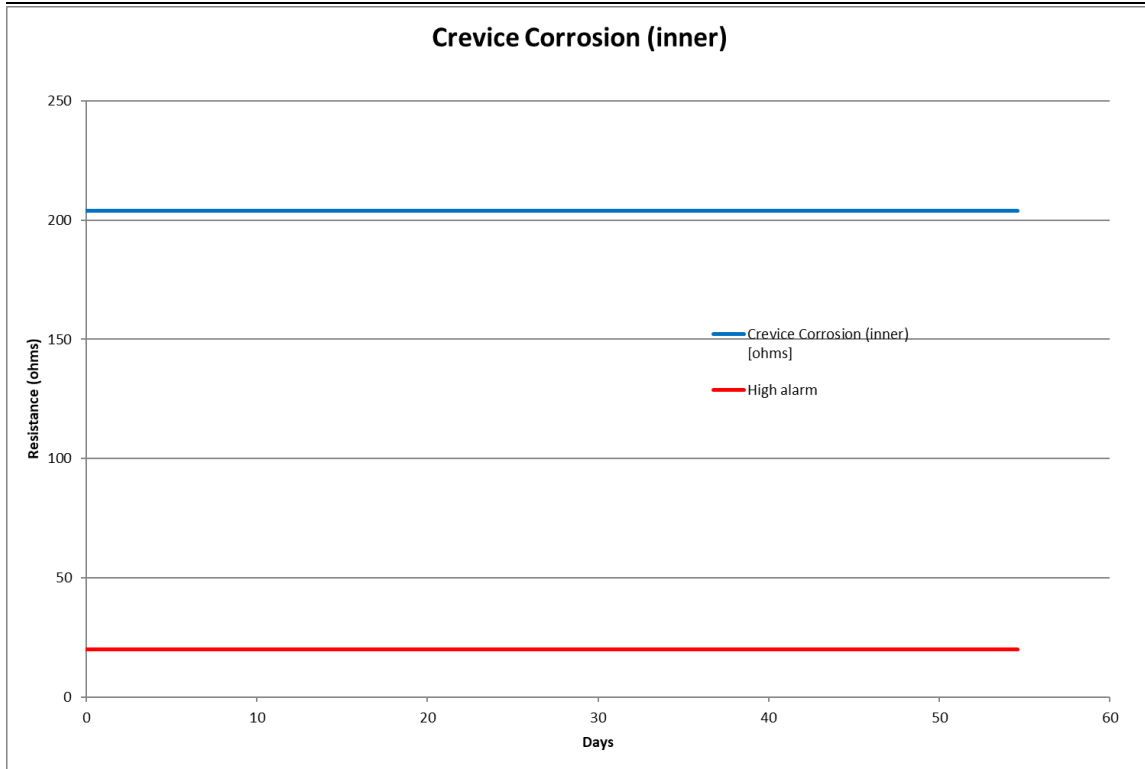
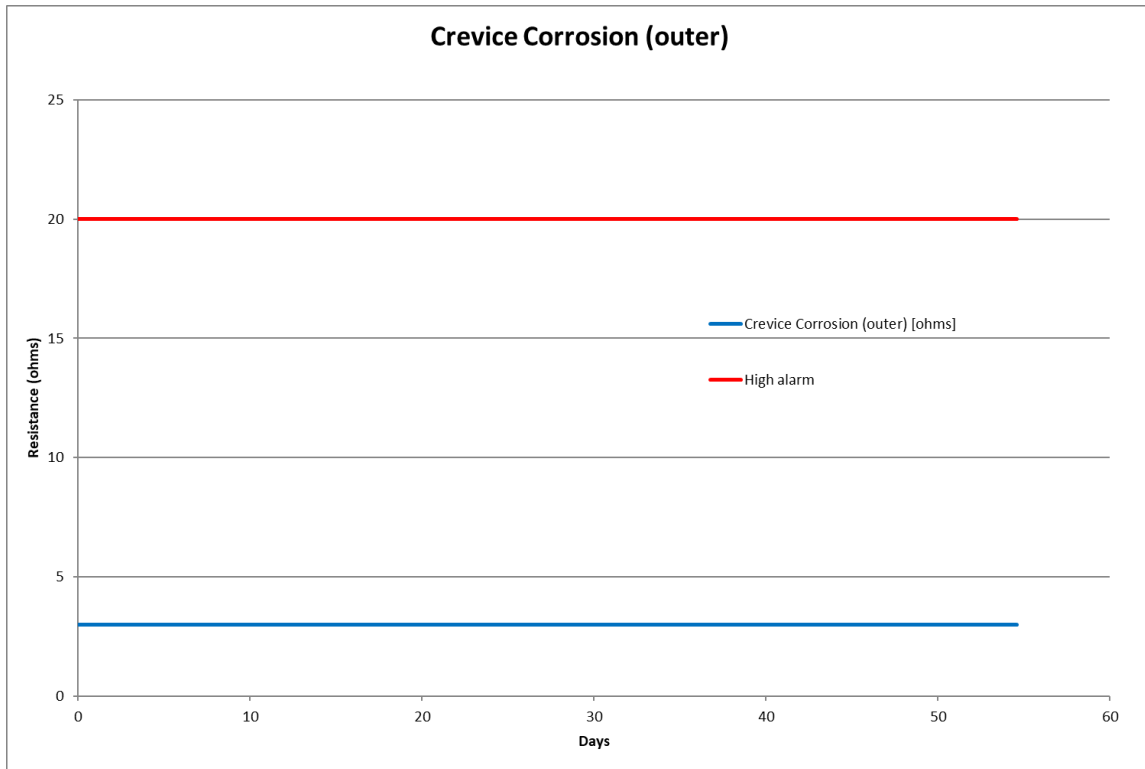
Conductivity



Comment: The measured value of conductivity was very stable until the 23rd August at around 730 micro Siemens, suggesting that very little inhibitor remained in the system. Metal surfaces were therefore not protected from the corrosive effect of high dissolved oxygen. After this date, Molybdate inhibitor was added. Conductivity however is now slowly dropping suggesting some consumption of active ingredients.

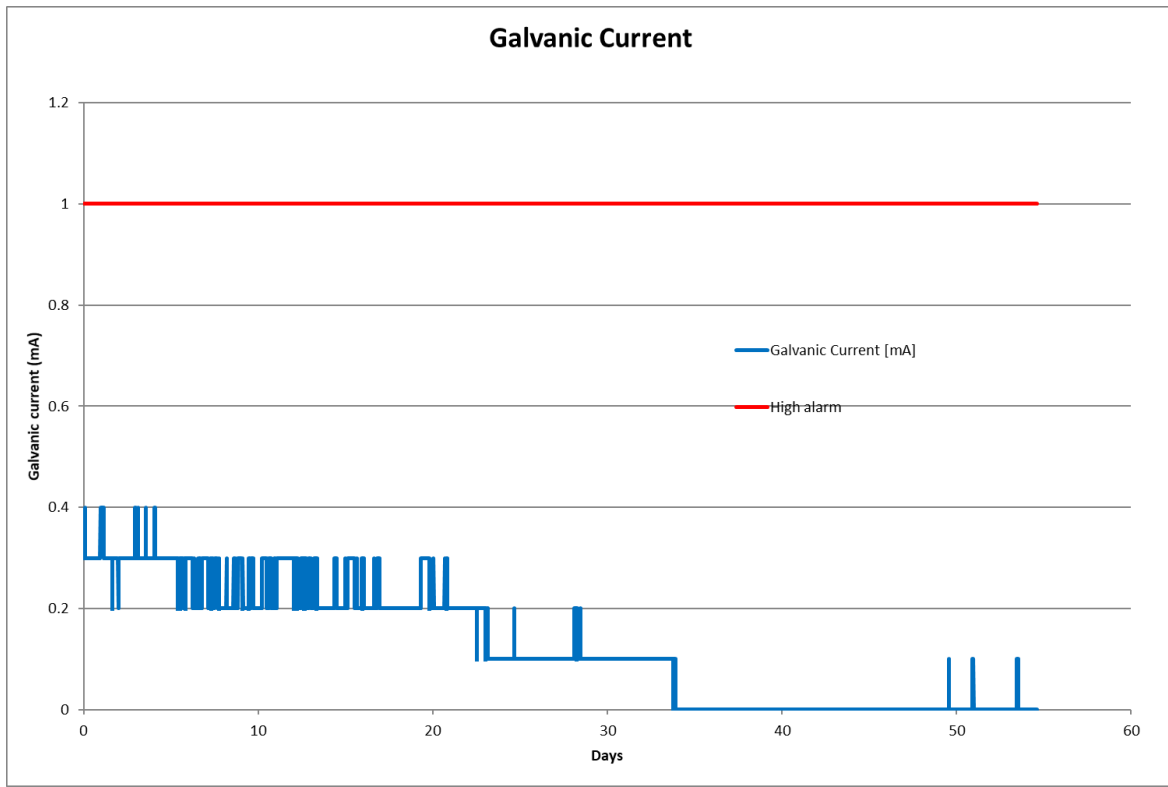
Note: Measurement of conductivity gives a good indication of the concentration of added chemicals when temperature effects have been taken out. For most inhibited waters conductivity should be around 2000 micro Siemens or above, dependant on the inhibitor and water hardness.

Crevice Corrosion



Comment: One of the fine steel wires (0.25mm dia) in the crevice corrosion sensor corroded through in a previous month (May). However, the outer wire is still intact suggesting that crevice corrosion is high but not exceptional.

Galvanic Currents



Comment: The mA output from the galvanic current sensor shows that corrosion rates (of steel) are decreasing. The effect of adding inhibitor has clearly been beneficial and is resulting in passivation of the steel surfaces. Corrosion rates are now negligible despite the dissolved oxygen being higher than ideal.

Note: Hevasure use a patented galvanic current sensor to measure corrosion rates of steel on open surfaces. A 1mA output is approximately equivalent to a corrosion rate of 0.14 mm/ year. (The BuildCert limit for corrosion rate is 0.04 mm per year)

Signed.....

Date.....24/09/2019