EnviroAqua CONSULTANTS INC.

Water Talk

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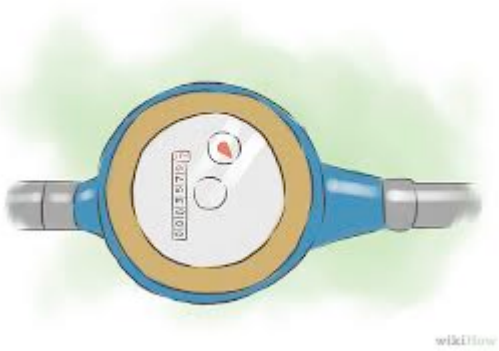
DETECTING WATER LEAKS IN CLOSED LOOP SYSTEMS

We all have been faced with inhibitor levels decreasing between sampling periods. We also tend to have the same debate over what happened?

- Was there ongoing water loss to the system?
- Was there work or repairs completed on the system?
- Did microbiological factors decrease my inhibitor level?
- Is a pressure relief valve failing?
- Is the makeup water pressure regulator set higher than the pressure relief valve?
- Was there some other factor that played a role in my expected result?

The easiest way to check for leaks in a closed water system is to read and record the water usage displayed by a totalizing water meter on the makeup water line. But what if the water inlet flow was too slow to register on the water meter? This could very well be a concern on smaller loops where even a small volume change could easily affect the treatment level.



A second option would be to use an inert, fluorescent material to help indicate a leak. The florescent material (say green for our purposes) can also be used to help pinpoint leaks or do leak studies. If you see green water on the floor you could easily determine there must be a leak nearby!

If the system does not have a water meter, the existence of leaks can be checked by testing the inhibitor concentration in the recirculating water. The inhibitor concentration should be measured once per month using molybdate, silicate, or azole, but not nitrite.

Do not depend upon the nitrite test as nitrite can be lost due to bacteria action. If nitrite is measured and its concentration has decreased while the conductivity has remained constant, biological contamination is very likely present. Steps should be made to address the

biological issue (in this case) to keep the system from ongoing or future fouling.

If the measured values for both conductivity and inhibitor values decrease, water has been lost in the system. Borate concentration would also be a good indicator of leak detection.

Another convenient indication of water loss is the measurement over time of a drop in conductivity. If the system water conductivity equals that of the makeup, it is pretty clear the treatment chemical is totally absent. Inert florescent material can be added to the system and used to help pinpoint leaks, or do leak studies. Loss of the fluorescent material can be monitored in real time; and such loss indicates leaking is ongoing.

When the inhibitor concentration has dropped to 98% of the original value, 2% of the system water will have been lost. If the lapsed time for this 2% loss is less than 4 months, the system's loss of water can be considered excessive, and any leaks should be addressed.

A 2% loss over 4 months equals 0.5% loss per month. The accuracy of this test (and the following example) is limited, so if the loss for any month exceeds 1%, the test should be repeated. If retesting confirms the water loss, the leaks should be found and eliminated.

FOR EXAMPLE:
The initial molybdate concentration in a chilled water system is 125ppm. After 4mo, the concentration is 123ppm. Is the water loss excessive?

EQUATION:
Loss = ([initial – final] / initial) x 100
= ([125 – 123] / 125) x 100
= 1.6% after 4 months

So the monthly loss based on the 4-month result is calculated:

1.6% over 4 months = 0.4% per month

This loss is less than 1% per month and is therefore not considered excessive.

NEXT EXAMPLE:
What if the concentration had dropped to 123ppm after 1 month, the loss would then be:

EQUATION:
Loss = ([125 – 123] / 125) x 100
= 1.6% after 1 month

Now the monthly loss is 1.6% per month!

So this loss is now greater than 1% per month, and the system should be inspected for leaks accordingly.

CONCLUSION

Water losses cause us difficulty in maintaining proper inhibitor levels in closed recirculating loops. Depending on the testing frequency, this could cause long term potential issues with pumps, equipment, heat exchangers, etc.

Chemical treatment is just one area where leak identification can reduce cost. Depending on where you are, there is considerable stress being placed on water conservation due to some drought conditions.

Regardless of the above, identifying leaks in closed systems is critical to reducing the overall cost of operation, while maintaining the superior performance desired.