

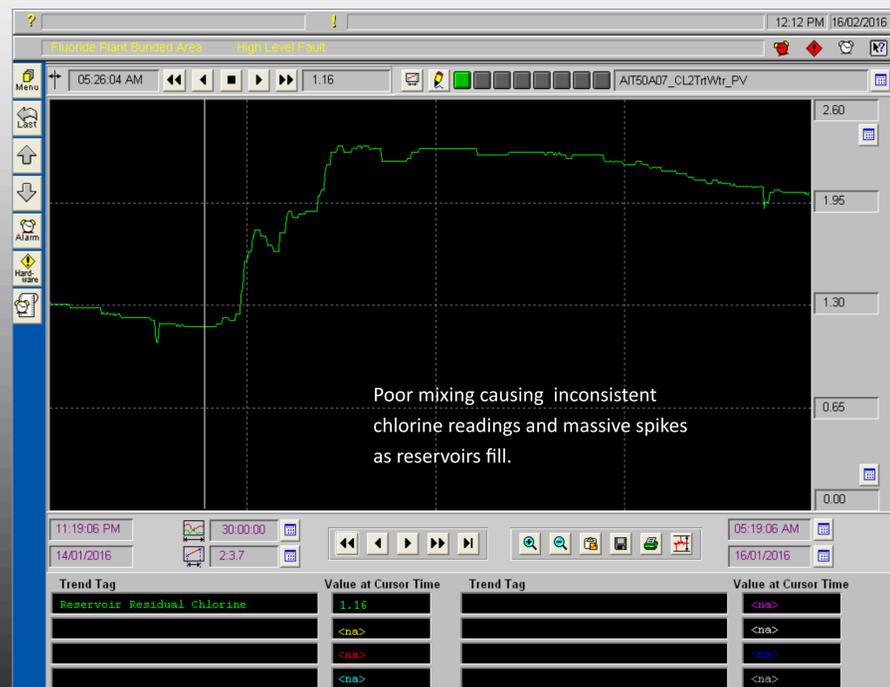
INVESTIGATION INTO CHLORINE ANALYSER CALIBRATION DRIFT



Reservoir inlet 50 metres from analyser

BACKGROUND

The Toowoomba Regional Council Mount Kynoch Water Treatment plant has three Storage reservoirs onsite which have a combined capacity of 30.7ML. All three reservoirs are interconnected and each one is fed from the WTP Clearwater tank at a rate of 420-620L/sec, depending on the flow into the plant. Two of the reservoirs are circular in shape and have a similar capacity of 9ML each, while the third is connected to one of the circular reservoirs and has a capacity of 12.7ML. The largest reservoir is approximately 50 meters in length; all are constructed of concrete, while the larger has a poly liner installed. Through ongoing review by WTP Operators to improve Chlorine residuals from the WTP into the distribution system, a decision was made to install an online chlorine analyser at a small booster pump station which is situated a short distance (10 meters) from the three reservoirs. Water is received directly from the largest reservoir to the analyser and is fed via one of the four Hydrovars (which continually operate) to address low pressure issues into part of the distribution network. A chlorine residual reading can be read onsite at the booster station or remotely through our SCADA system. Alarms have been installed to page the operator if the chlorine residual deviates below 1.5ppm or over 2.4ppm. The optimum chlorine residual the operator is aiming to achieve at the reservoirs is 2.00ppm.

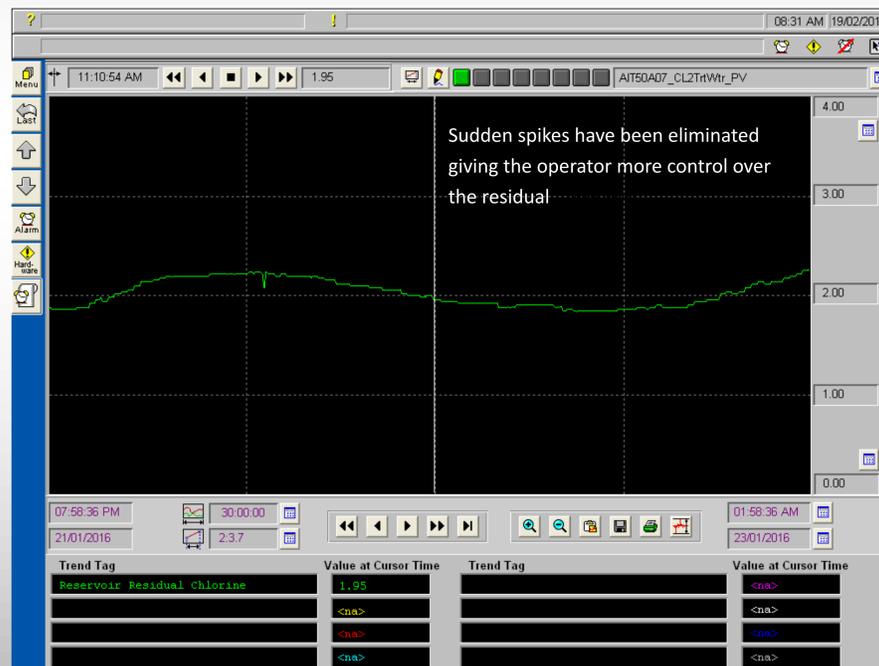


PROBLEM

Four to Five weeks after installation of the online chlorine analyser, WTP Operators noticed a number of inconsistent residuals were being recorded. A calibration check performed on the accuracy of the analyser was carried out by staff and feedback from the supplier indicated that the meter was operating correctly and accurately. The erratic results were of real concern as two nearby hospitals have to be notified if the residual leaving the site exceeds 2.50ppm thus causing problems with their renal dialysis units. Due to the unique shape and sheer size of the largest reservoir, it was deemed that different pockets of chlorine residuals existed throughout the body of water, potentially being caused by the limited mixing when treated water is pumped into the reservoir. The only mixing that occurs is when the Clearwater pump feeds the reservoir through the vertical inlet pipe. This mixing is very limited due to the reservoir being 50m long.



Mixing pump installed for trial



SOLUTION

Through consultation with the WTP Operators, it was concluded that the varying chlorine results were due to insufficient mixing of the water in the large reservoir, therefore explaining the inconsistent and/or variable chlorine levels. To address this possible issue, staff would need to come up with a possible solution to improve the mixing in the reservoir that would be cost effective, easy to install and maintain. A small sump pump was fixed to the internal stairs of the reservoir, approximately 5m away from the inlet pipework. This trial pump is a submersible with float and is rated at 600L/min (the installation of the pump was made without any pipework connected to the pump, a suggestion was made to install a length of flexible pipe for better mixing). The plan was to achieve optimal mixing of the fresh water as soon as it enters the reservoir and to continue mixing the water after a fill has occurred. The trial was quite remarkable, with results of more consistent chlorine residuals becoming more evident after a few hours of pump installation. With further investigation and detailed graphing through SCADA, results of more even and consistent chlorine residuals were achieved. The test carried out was only for a short term trial of 10 days with inconsistent chlorine residuals returning after mixing was stopped. With all data tabulated, staff have obtained valuable information which will provide evidence for a more permanent option through the assistance of Asset Management.

Benefits of the mixing pump so far include:

- Decreased need for calibration of the Deplox online chlorine analyser
- Improved control of the chlorine residual leaving the reservoir
- no non-conformances for the month
- Safe drinking water supply for sensitive customers (renal dialysis)

Cost for the mixing pump \$900.00 with running costs at \$600.00/year

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