EDMONTON WASTEWATER TREATMENT PLANT RAS RAKE SPRAY PROJECT

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40th Annual WIOA
Queensland Water Industry Operations Conference and Exhibition
Clive Berghofer Recreation Centre,
University of Southern Queensland, Toowoomba
16 to 18 June, 2015

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ABSTRACT

The addition of a spray system on the RAS rake at the Edmonton wastewater treatment plant has minimised scum capture within the screenings. Prior to installation, the screenings bin was being emptied much more regularly than post spraying. The cartage savings have been over $900 per month and forecast to be around $11,500 per year.

In addition to this, we have seen savings in Longpac endless bag used to collect screenings. The reduction of water/weight in the waste bin has significantly reduced the chances of bag failure and possible environmental issues with spillage during storage and transfer.

Ultimately the plant has saved money and reduced both environmental risk and workplace health and safety issues.

1.0 INTRODUCTION

The Edmonton wastewater treatment plant is a relatively typical activated sludge system with an Oxidation ditch and clarifier. There is no physical scum removal system so the plant does experience scum build up within the biomass.

The RAS system is a wet well and contains a rake style screen. A reasonable amount of scum finds its way into the RAS well via the clarifier and this scum gets picked up by the RAS rake along with other debris. The resultant scum and entrained water is transferred to the screenings bin and eventually carted off site to landfill. Operators noticed an opportunity to reduce the amount of scum that was unnecessarily making its way to the RAS screenings bag. Further investigation highlighted potential flowon benefits in the form of a reduction in the cartage frequency and costs being imposed upon the plant. The original cartage times were a weekly event. The average monthly cost was approximately $2,250. This was with the rake system operating once per hour. The monthly output was approximately 4.5 tonnes.

Visual observations led to the discovery of these costs so the operators began discussing ideas of improving the system. The outcomes of this are discussed below.

Figure 1: ***Edmonton WWTP Showing Bioreactor, Clarifier/RAS and Scum***

2.0 DISCUSSION

Observation while on daily walk arounds showed how the scum was being dragged up the rake system. Operators used service water to lightly hose the comb & the visual result were immediate. The screenings remained and the scum was washed back into the RAS well.

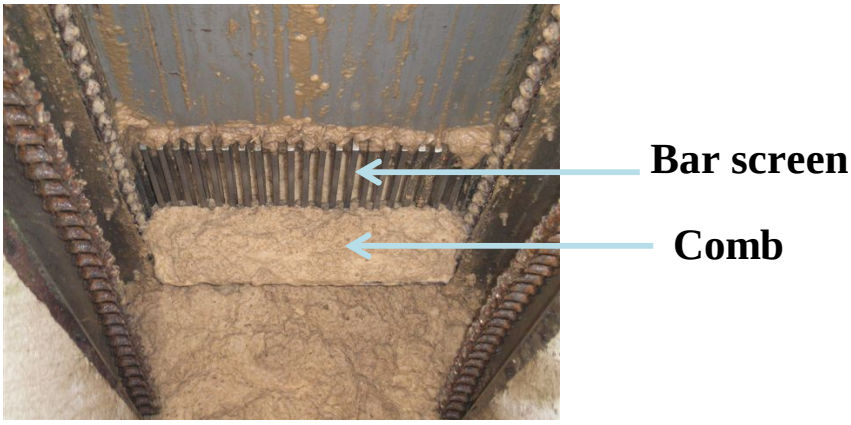

Figure 2: ***RAS Rake System with Comb, Bar Screen and Plenty of Scum!***

Figure 3: ***RAS Rake System with Comb After a Light Hose***

This initial success led to the same service water hose being set up to constantly spray onto the rake and observe the bin over a 2 week period. Visually bags were smaller and this was confirmed by bin weight dockets. Operators also found it took longer to fill the skip bin which would prove to be yet another opportunity to cut costs. From here operators designed an automatic system with a proper spray nozzle plumbed in using service water with a solenoid valve that was controlled by the SCADA system. This valve was set up to open when the rake system activated and run for a set time. This approach saved a lot of water being used from a constant spray set up and fine tuned the operation a lot more.

A small filter was even installed on the reuse line to protect the solenoid valve and spray nozzle from possible blockages from the service water. Trends indicated when on, the spray system used around 0.7 L/s. If left in a constant flow this would have amounted to over 60,000 litres of reuse water used for the day. The solenoid valve runs for less than 3 minutes each time the RAS rake runs. This is once per half hour so the resultant water usage is less than 6,000 litres per day. This amounts to a huge saving of water usage and shows the benefit of automating system such as this. This is a ten fold reduction in service water.

Figure 4: ***Screenings Bag Prior to Instillation of Spray System***

Figure 5: ***Screenings Bag After Instillation of Spray System***

Figure 6: ***Filter & Solenoid Automated through the SCADA System***

Figure 7: ***Spray Nozzle***

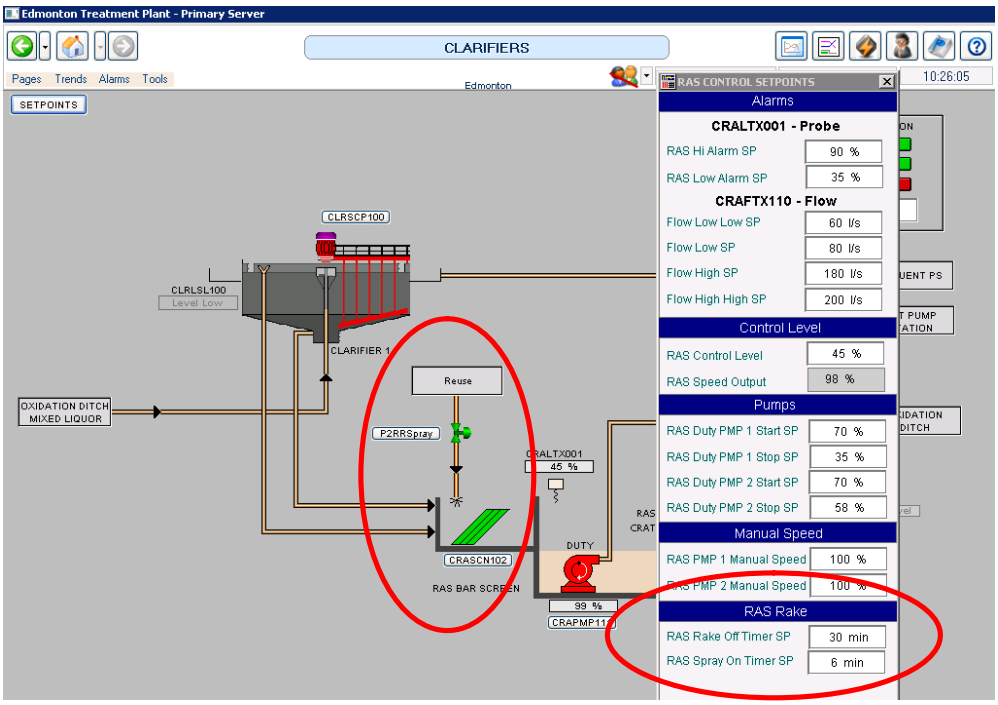

Figure 8: ***The Updated SCADA System Showing the Spray System Control***

From here operators monitored the system and collected the screenings bin weight information. We were able to reduce the collection times from weekly to fortnightly after the first month. An additional saving was realised here by tagging onto an existing bin transport run. This saved an additional time cost for the bin when it was on the weekly schedule. It is worth noting that these reductions were made even though we increased our screen rake run times to once every 30 minutes from the original once per hour. The data from the results are shown below.

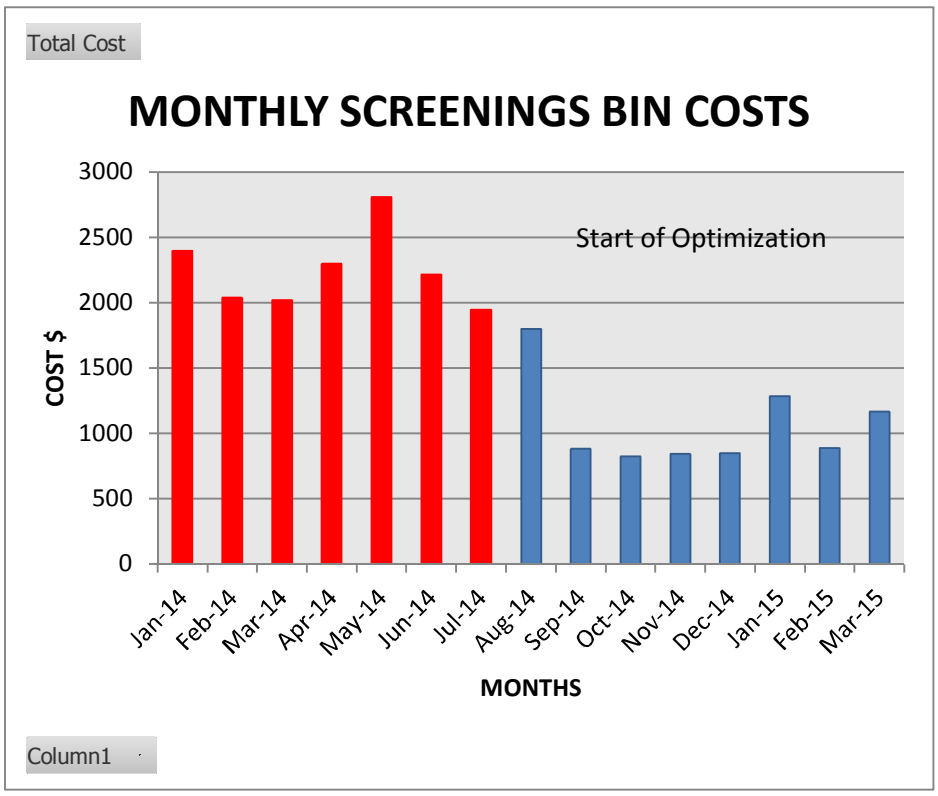

Figure 9: ***Graph of Monthly Costs***

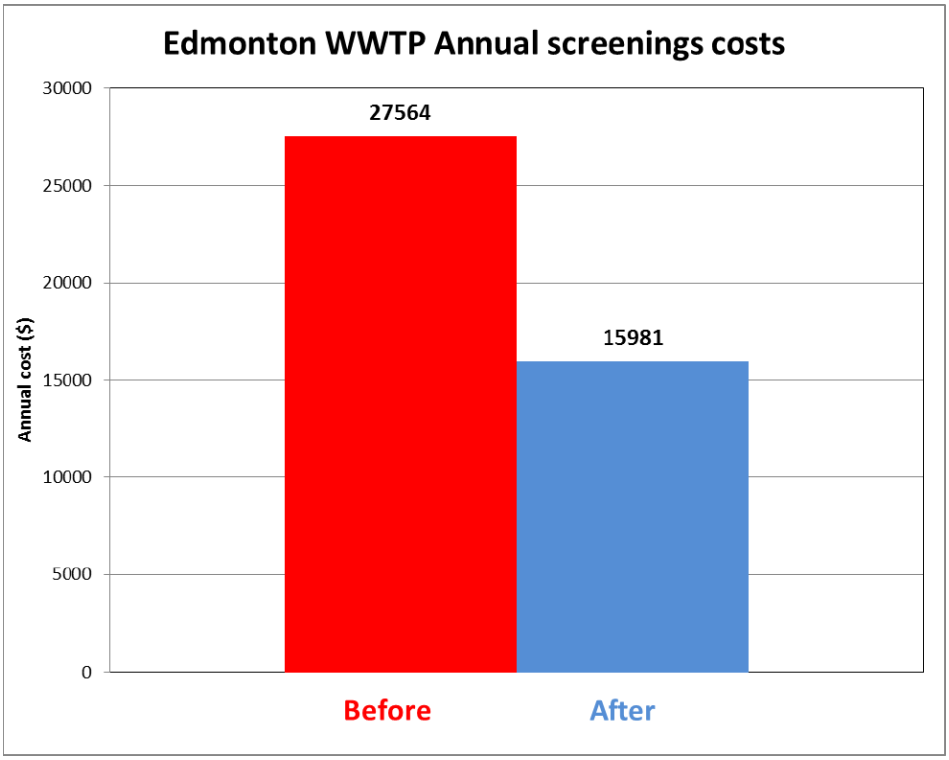

Figure 10: ***Predicted Cost Savings***

The above graphs amount to financial savings of approximately $965 monthly and $11,600 annually to the council and its ratepayers.

3.0 CONCLUSION

This project clearly illustrated that sometimes a very simple idea can often lead to substantial success and efficiency improvements. The installation of a simple spray nozzle has saved the treatment plant well over $10,000 per year for very minimal outlay. The cost of the installation was paid off in a matter of months.

As previously stated, risk to the environment was also reduced as was operator safety due to less unnecessary scum/water/weight in the screenings bags.

It shows that although a plant may appear to be running well, a keen eye for detail can often show that improvements can be made in areas often overlooked in the day to day running of a treatment plant.

4.0 ACKNOWLEDGEMENTS

We would like to thank the treatment plant operators involved with the idea and its follow through to completion. We would also like to thank the maintenance staff who did a fanstastic installation job. This goes all the way to the SCADA team who programmed the operation.