

DETERMINE WASTEWATER TREATMENT PLANT PERFORMANCE ON PHOSPHORUS REMOVAL

Using a Hach Phosphate online analyser, a UK water company was able to assess the capability of a wastewater treatment plant (WwTP) to remove phosphorus and to assist with informing future process design.



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as P with an average concentration of 2.2 mg/l as P. The range of the Hach Phosphax sc LR instrument is 0.015 to 2 mg/l and as a result, site staff were requested to attempt to reduce the ASP effluent to circa 0.5mg/l for the duration of the trial.

The instrument was located in the final tank distribution chamber complete with prefiltration via a Hach Filtrax unit. The trial would be judged to be successful if the accuracy of the online instrument was within 20% of the Ortho Phosphorus measurements confirmed by additional laboratory analysis. The instrument target availability including maintenance and outages was set at 95% for the trial.

Testing Regime

At least 2 physical samples were taken every week from the Filtrax prefilter unit located in the FST distribution chamber. The Phosphax SC ortho P readings were referenced at the time of sampling using the built-in data logging capability on the supplied SC1000 controller.

The samples were analysed for Ortho / Total Phosphorus and Suspended Solids at the water company laboratory as well as on site using a Hach spectrophotometer (DR2800). The results are shown in the graph which show excellent correlation between the Phosphax and both site spectrophotometer and laboratory results.

In order to improve the reliability of the instrument still further, the Filtrax prefilter unit was replaced with a Hach TMS unit. This was mainly because of the very high suspended solids encountered in the ASP effluent chamber. The TMS filter utilizes compressed air and chemical cleaning and is designed for very high suspended solids applications.

The WwTP had a revised consent limit of 0.25mg/l total Phosphorus for discharge to the receiving river. In order to assess the capability of the plant to remove phosphorus and to inform future plant design and efficiency opportunities, a low range Hach Phosphate analyser, the Phosphax sc LR, was installed immediately after the activated sludge plant (ASP).

Hach were asked by the customer to provide the instrumentation for a three month trial in order to assess the accuracy and robustness of the analyser, increase its familiarity with operators and importantly to determine the P removal capability of the process stream up to an including the ASPs.

The existing WwTW plant has a carbonaceous activated sludge process with tertiary nitrification provided by nitrifying trickling filters. The site has 6mm screening followed by grit removal. Primary settlement is currently provided by 3 radial tanks and the main treatment process is a surface aerated activated sludge process with 3 radial final tanks

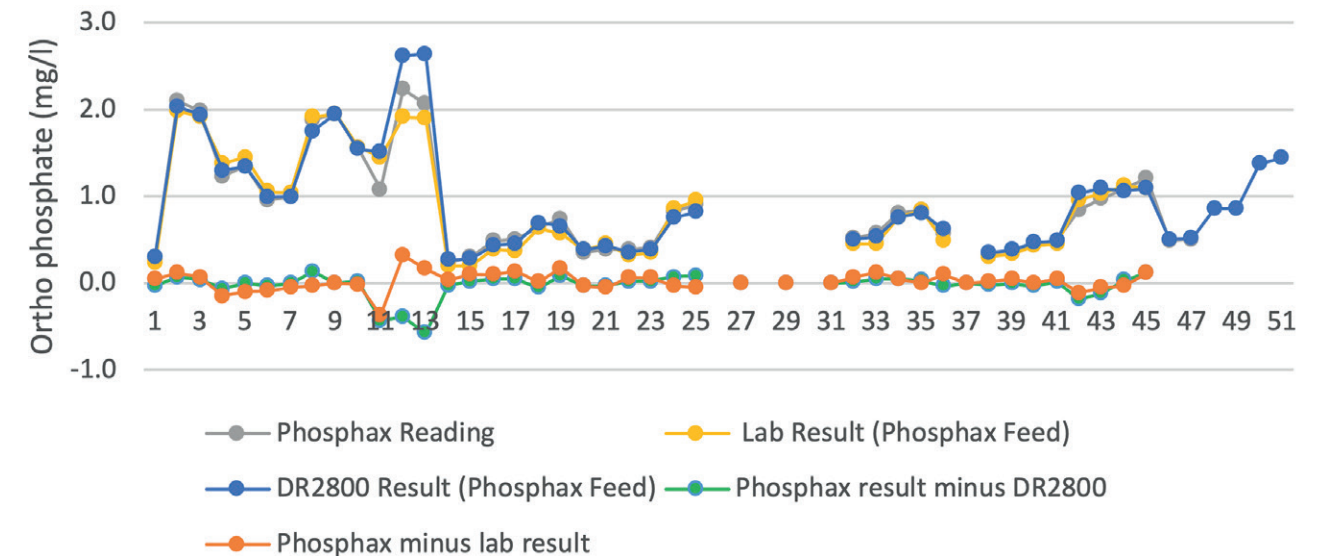
(FSTs). Tertiary nitrification is provided by 4 mineral media nitrifying trickling filters (NTFs). Surplus activated sludge is co-settled with primary treated sludge, and the combined sludges are then pumped to a storage tank and eventually removed from site by tanker.

The Hach Phosphax sc LR analyser



Orthophosphate concentration in the activated sludge tank effluent had previously fluctuated from 0.6 to 3.3 mg/l

Difference Between Analyses



Conclusion

The results of the study had a number of conclusions:

- That the Hach Phosphax sc LR is a reliable and accurate instrument for the determination of orthophosphate in the range 0.015 – 2mg/l as P
- That the wastewater treatment plant was capable of regularly reducing ortho P concentrations to <0.5mg/l after the

ASPs though careful management of the process. This was previously regarded as being in the range 0.6 – 3.3 mg/l as P

- The trial has assisted the project team with the scoping of the minimum additional processes required to reduce ortho P concentrations to <0.25mg as P in the final effluent. This may allow significant cost savings for the water company involved.