

Online Suspended Solids Monitoring Contributes to Reduced Operating Costs

It can be a tough job for the water treatment industry, faced with the needs to ensure the effectiveness of their treatment plants and processes whilst keeping operating costs within strict budgets. Finding a solution to these challenges means not only investing in the most appropriate technologies so that treatment works fulfil their obligations, but also evaluating ways of optimising performance so as to get the best return on capital investment.

Suspended solids load is one of the most important aspects of the treatment process as it has an influence from crude sewage intake right through to final discharge. Monitoring final effluent suspended solids is a key parameter for assessing the quality of the effluent in respect of meeting consent levels. It is also an indicator of the basic performance of the treatment works as any rise in the level of suspended solids will warn of possible process problems upstream of the final effluent point.

By monitoring and recording suspended solids levels at key processing stages, works managers are able to exercise effective control of the plant and ensure that discharge consent levels are adhered to and running costs optimised. South West Water's WWTW at Exmouth in South Devon is a great example of how the investment in an integrated suspended solids monitoring system supplied by Partech can contribute to cost-effective effluent treatment.

Serving a seaside resort where the population increases substantially during the summer months, Exmouth WwTW has seen much of its plant refurbished in recent years. Located close to Blue Flag accredited bathing beaches and the environmentally sensitive Exmouth Bay, means that South West Water is under constant pressure to ensure that the works does not breach its consent levels.

Exmouth WwTW was constructed several decades ago as a primary treatment plant, but BAFF (Biological Aerated Flooded Filter) process technology was introduced in the 1990s. The BAFF plant enhanced the performance of the works and presented the opportunity for works optimisation and reduced operating costs.

A key part of the optimisation process was linked to the fact that the works has large variations in the crude sewage flow rates. During periods of dry weather when flow rates are low it is not always necessary to dose chemicals at the inflow and even though the suspended solids content can be high, the Ultra Violet disinfection process can cope with this loading. It is when the flow is high and the level of suspended solids is correspondingly high that chemical dosing is required. Therefore, a solution that would ensure economical use of chemicals and contribute to improved plant performance was arrived at in conjunction with Partech Instruments.

Improved management of chemical dosing at the front end of the works through the deployment of several Partech Turbi-Tech 2000LS suspended solids monitors was seen as a way of optimising the treatment process (Fig. 1). Originally chemical dosing at the crude inlet was based on flow rate, with most of the dosing taking place during the working day, so regardless of load conditions chemicals were constantly being used. Eventually more sophisticated techniques were introduced whereby the chemical dosing was linked to peaks in the flow rates, so at times when the flows were higher more chemicals would be dosed. However, when flow rates were affected by high levels of rainfall, highly expensive chemicals would be dosed automatically although they were not needed. By continuous monitoring of flow and suspended solids level using a Partech Turbi-Tech 2000LS and 7200 Monitor, it was recognised that the quantity of chemicals could be readily adjusted according to demand and significant cost savings made.

This decision was made following site visits by Partech, who were also involved in providing guidance on the other aspects of the treatment process where suspended solids levels were influential. In this way all the critical process stages could be monitored in real-time and savings could be made, not just in the cost of chemicals but also by eliminating frequent backwash cleaning.

A second Turbi-Tech2000LS was positioned at the BAFF splitter tank to provide a feed-back loop to control the inlet dosing (Fig.2). The position of this sensor records how well the primary tanks are performing the settlement process. If there is too much clean water coming off the primary tanks, operatives need to know the cause.



Figure 1: Partech TurbiTech 2000LS units were installed at the front end of the works

Contributing factors could be rainfall entering the tanks or chemical overdosing. Should the process fall out of its predetermined operating range, plant operators are warned via the 7200 Monitor, which has the capability to raise alarms. (Fig.3).

The third and last part of the suspended solids monitoring regime involves monitoring in accordance with Environment Agency discharge consent levels. Before the introduction of the suspended solids monitoring regime, operators at the works had very little real-time knowledge on how well the works was meeting its consent levels. Monitoring suspended solids at the outlet was only performed manually with samples being sent to the Countess Wear Laboratory for analysis, so all information was historical.



Figure 2: Partech Turbi-Tech 2000LS positioned at the BAFF splitter tank

Installing Partech's Turbi-Tech 2000LS at the discharge point enables South West Water to be fully aware at all times as to whether it is complying with its discharge consent levels and if the whole treatment process is functioning correctly, so contributing to the information that demonstrates the effectiveness of the works to the EA.

Since the suspended solids monitoring regime has been introduced, backwashing of the BAFF reactors has been reduced substantially. In addition, usage of chemicals for dosing purposes has come under far tighter control leading to savings in this important area.

Partech Instruments has a long history of providing solutions for determining suspended solids and turbidity levels with the use of its Turbi-Tech 2000 Sensor and 7200 Monitor (fig 3) in effluent treatment plant operations. Available in two versions, the LS and LA, Partech's Turbi-Tech 2000 Sensor uses Infrared 90° Light Scatter or Light Attenuation as its measuring principle. The LS version is designed to monitor low levels of solids or turbidity and is typically installed at the final effluent discharge point.

The Turbi-Tech LA has an operating range suitable for use in aeration systems and may be used to monitor mixed liquor suspended solids (MLSS) and returned activated sludge (RAS). Both versions of the Turbi-Tech 2000 feature a unique self-cleaning system which means that the sensor's optical surfaces cannot be contaminated and ensures continuous performance.



Figure 3: Partech 7200 Monitor has the capability to raise alarms

Summary

The suspended solids monitoring systems provided by Partech Instruments have now been operating for over 12 months. According to reports provided by South West Water, this has had a major impact on the overall performance and operating efficiency of Exmouth WwTW and has led to further similar installations at several other sites.

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