

Using Suspended Solids Measurement in Dewatering of Wastewater Clarifiers

Introduction

Dewatering refers to the periodic removal of sludge that accumulates at the bottom of primary wastewater clarifiers (also known as settling tanks or sedimentation basins). Sludge is made up of solids in the wastewater that have settled at the bottom. The accumulation is referred to as a sludge blanket.

Sludge must be removed to make room for more settling. Dewatering must be timed so that the solids concentration of the underflow is within the design parameters of downstream equipment such as thickeners and digesters.

Critical factors

The critical factors include the influent rate, the wastewater source and composition, the settling rate, the blanket height/solids concentration correlation, and downstream solids concentration requirements.

Influent

Influent to a primary clarifier is raw wastewater often mixed with recycled effluents from within the plant. The suspended solids are typically large and easily settled. Extreme influent flows can cause disruptions in the sludge blanket accumulation.

Detention time

The amount of time wastewater and sludge remain in the tank depends on the depth of the tank, the influent rate, surface overflow rate, and the required solids concentration of the sludge.

Effluent

For a primary clarifier, the underflow solids concentration can be less (0.5% to 1.5% solids) if the sludge is intended for thickening. Solids concentration should be higher (2.0% to 5.0% solids) if the sludge is intended for digesting.

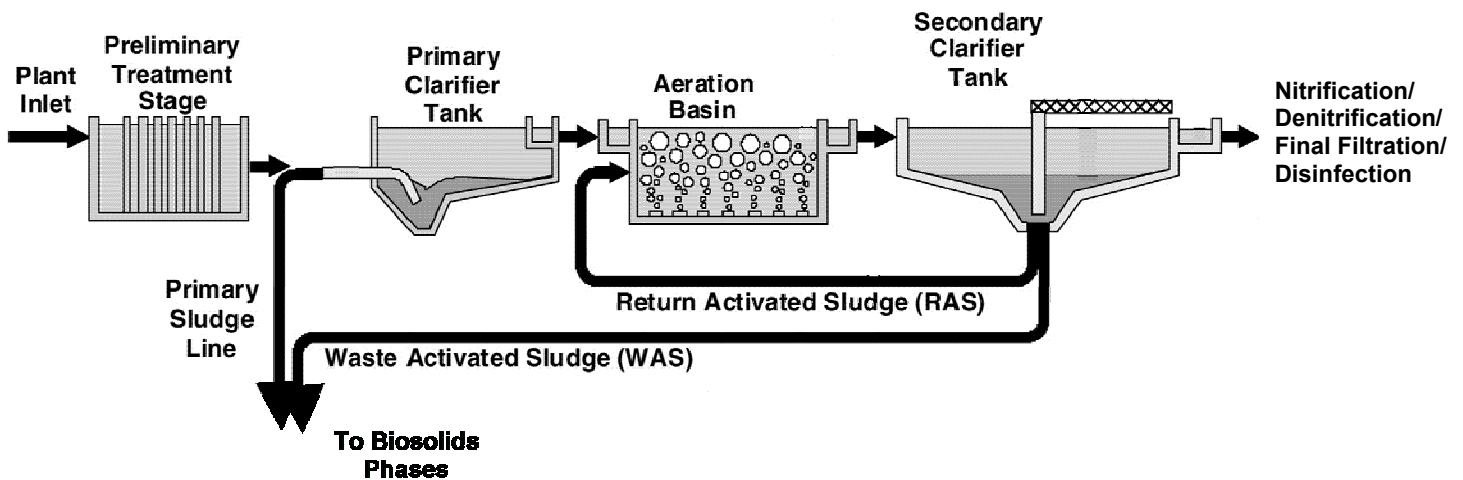


Figure 1 – Typical Clarification Dewatering Stages in a Wastewater Treatment Plant

The effluent should be relatively free of suspended solids, grease and scum. The effluent is typically directed to an aeration basin for activated sludge treatment.

Product Application

A SOLITAX™ hs-line Sensor has sufficient range (0% to 10% solids) to monitor underflow pump-out for most applications. The instrument can be mounted to the sludge pipe through a ball valve and connected to an sc100 Controller. (see *Figure 2*). The data should be used to determine when the shut off solids level has been reached.

For automated dewatering, the data from the underflow sensor can be used to turn off the sludge pumps once the solids concentration has fallen below a selected level. Data from a Hach OptiQuant™ Sludge Level Monitor and Probe (in secondary clarifiers) or a SOLITAX ts-line system configured as a limit alarm (in primary clarifiers) can be used to turn on the pump.

This application solution is one of several Hach documents describing wastewater process control based on continuous suspended solids/turbidity measurement. For more detail, refer to:

“Monitoring Suspended Solids/Turbidity in Liquid Processing Stages of Municipal Wastewater Treatment Plant,” Hach Application Solution AS-SS1

“Monitoring Suspended Solids in Biosolids Processing Stages of Municipal Wastewater Treatment Plant,” Hach Application Solution AS-SS2

“Measuring Turbidity and Suspended Solids in Clarifier Supernatant,” Hach Application Solution AS-SS3

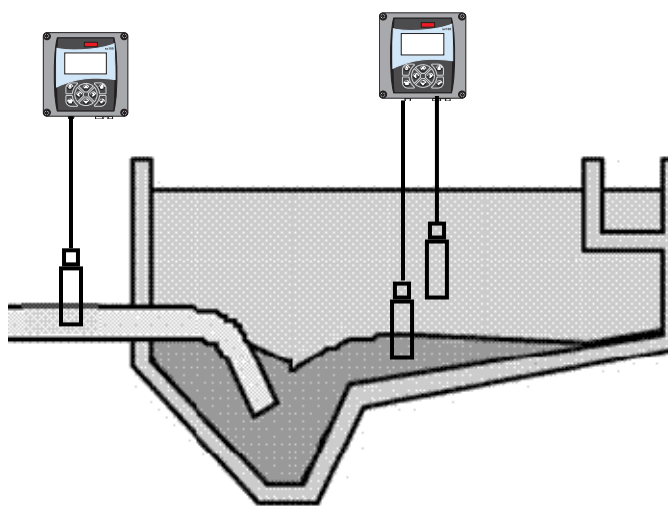
“Belt Filter Press Monitoring/Control in Wastewater Treatment Plants,” Hach Application Solution AS-SS4

“Centrifuge Monitoring/Control in Wastewater Treatment Plants,” Hach Application Solution AS-SS5

“Mixed Liquor Suspended Solids in Wastewater,” Hach Application Solution AS-SS7

“Suspended Solids Monitoring for Sludge Pumping Control/Savings,” Hach Application Solution AS-SS8

Figure 2 – An sc100 Controller with two SOLITAX ts-line Sensors (right) monitors the solids level, and a SOLITAX hs-line Sensor with an sc100 Controller monitors the underflow in a primary clarifier.



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