Measuring Turbidity and Suspended Solids in Clarifier Supernatant

Introduction
Supernatant is the liquid remaining above a sediment or precipitate after sedimentation. From sedimentation basins, thickeners or digesters, the supernatant is piped to succeeding treatment processes, or is recycled. Operators monitoring supernatant turbidity or suspended solids with a Hach SOLITAX™ ts-line Sensor can prevent excessive amounts of suspended solids from escaping the tank and overloading the next treatment step.

Critical factors
The critical factors in the optimization of clarifier efficiency are overflow rate, detention time and composition of effluent.

Influent
Primary clarifier influent incorporates raw wastewater, recycled waters from thickeners and digesters, and centrate/filtrate from dewatering processes; see Figure 1. Operators must keep this influent flow within the loading parameters of the tank to avoid excessive solids in the supernatant. Recycled digester liquors are treated first to remove septic materials. Left untreated, septic particles (which resist settling) will increase the turbidity of the supernatant.

Detention time
Detention time must be sufficient to allow the settling and separation of most suspended solids in the media. If the supernatant quality is substandard, the influent flow rate or solids concentration must be altered.

Effluent
Primary clarifier supernatant (effluent) is piped to aeration basins where it is mixed with return activated Sludge (see Figure 1). Supernatants from thickeners and digesters are returned to the head of the plant to be mixed with raw wastewater.

Figure 1 – Continuous monitoring of supernatant turbidity or suspended solids provides operators a real-time indication of the relative efficiency of the separation process.
**Product Application**

The SOLITAX ts-line Sensor is designed for low-level turbidity and/or suspended solids concentrations found in clarifier supernatants. In a typical clarifier installation, the sensor is mounted to a PVC pipe and suspended at a depth of about one to two feet in the carryover channel; see Figure 2. The sensor is connected to an sc100 Controller.

For primary clarifier supernatant, which typically feeds an aeration basin, acceptable readings are between 100 and 300 mg/L suspended solids concentration. If measured suspended solids concentration exceeds the high end of this range, operators may need to adjust the clarifier process to maintain the balance of suspended solids to aerobic microbe activity in the aeration basin.

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

“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

“Using Suspended Solids Measurement in Dewatering of Wastewater Clarifiers,” Hach Application Solution AS-SS6

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

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

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*Figure 2 – A SOLITAX ts-line Sensor and sc100 Controller monitor up to 1000 NTU turbidity in the effluent channel of a primary clarifier.*