Filter with turbidimeter shortly after the backwash cycle

USING TURBIDIMETERS TO MONITOR BACKWASH

Backwashing is a potentially destructive process if not properly managed. If the process is initiated too quickly, at too high a flow rate or stopped too quickly, severe damage to the filter bed can occur. Inadequate backwashing can also create just as many problems. Leaving too many solids in the bed can lead to short filter runs, and even worse, to more severe problems like mud balls, or cementing entire areas of the bed.

Water used for washing running into the backwash troughs

Rapid filters, rapid sand, dual media and multimedia beds require periodic cleaning to remove accumulated solids.

Backwashing is a potentially destructive process if not properly managed. If the process is initiated too quickly, at too high a flow rate or terminated too quickly, severe damage to the bed can ocurr. Inadequate backwashing can create nearly as many problems. Leaving too many solids in the bed can lead to short filter runs at best, and worse, to more severe problems like mud balls and even cementing entire areas of the bed.

Backwashing is an expensive process. In a well-operated utility, backwashing may consume around 2 % of the filter's production. Assuming a filter has a capacity of 7.5 million litres per day and operates for 48 hours between backwashes, the amount used to backwash would be approximately 2 % of 15 million litres or 300,000 litres of otherwise saleable drinking water.

Some operators and utility managers will argue that the water is not lost, "it is all recycled and therefore does not cost us much at all." In fact, those 300,000 litres are approximately an hour of production, which is 4 % of the daily capacity of the filter. This is not a trivial amount in water short regions, during periods of high demand or in drought conditions.

There are costs to backwashing:

- Water used for washing if recycled, must be treated again.
- If the water is not recycled, backwashing results in increased need for raw water resources.
- The water used for washing must be pumped. If the wash water is recovered, it typically goes through one or more stages of pumping and settling before it is returned.
- Water used for washing is not available for sale. An amount equal to the wash water volume must be treated or retreated.

Water operators typically monitor backwashing either visually or on the basis of a pre-set time. If it is done by time, at least it is consistent. On the other hand, it could be consistently too much water or too little. Neither is good. If backwashing is controlled visually, every operator will have a different idea of what constitutes clean and thus every wash will be different and the result is an inconsistent operation. Using a turbidimeter to monitor backwash has the benefits of consistency and a thorough wash based on measurement rather than on subjective opinion. SOLITAX t-line sc and ts-line sc turbidity sensors can be applied for monitoring backwash.

Figure 1 illustrates data from an actual backwash using a SOLITAX sc turbidimeter for backwash monitoring. The operations sta started backwash as usual based on a pre-set time beginning at about 3:00, and terminated the backwash based on their existing practices at about 3:15 (point B). But, as the data illustrates, the backwash turbidity leveled off at 3:13 (point A)! Continuing for an additional two minutes was unnecessary. The normal backwash rate for this large filter was approximately 64,000 litres per minute. Terminating the backwash 2 minutes early could have saved approximately 128,000 litres of saleable drinking water!

Monitoring Considerations

The amount of time saved will be around a few minutes at most. Yet, even these small amounts of time can add up to significant savings over time. Rapid response time is critical in achieving full benefit.A submersible design like the SOLITAX sc sensor is necessary to achieve nearly instantaneous measurement. Measurement must be within the filter, preferably in the backwash trough, to achieve

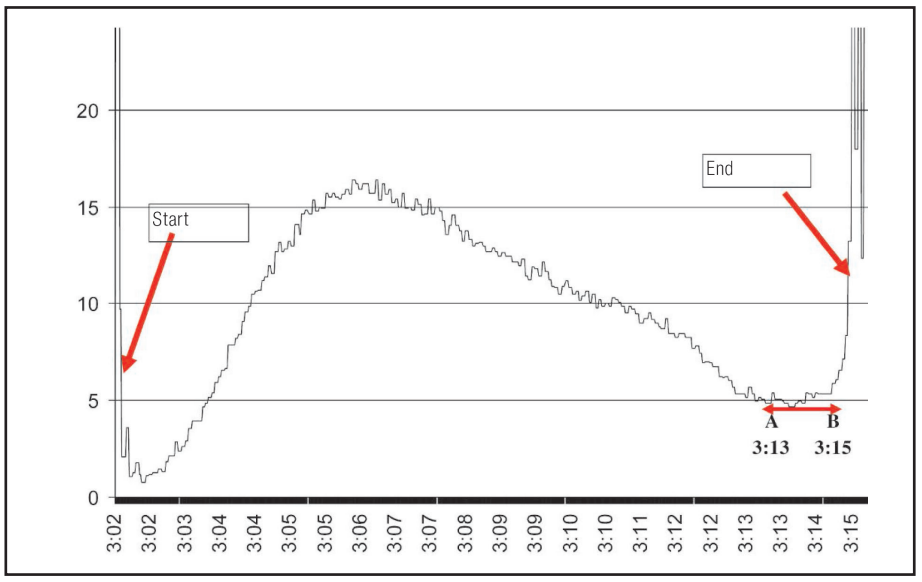

Figure 1: Actual Backwash Curve

optimal savings and for ease of access. Mounting the probe in a pipe downstream of the filter or in a manifold to monitor a number of fi lters with the same sensor may well create too much delay in measurement. This delay will eliminate any possible benefit that could otherwise be gained. In-pipe or manifold mounting should be used only as a last resort.

SOLITAX sc turbidimeter mounted above the filter bed

Monitor The Backwashing Process

Visual or time based judgment of the backwash period can also lead to under washing. As indicated earlier, serious problems can result from ineffective cleaning of the filter bed. Using a SOLITAX sc turbidimeter to monitor the backwashing process will help to restore the bed to good condition. Invariably, this will lead to cost savings.

Calculations of Savings by Using

Turbidimeters to Monitor Backwash When properly applied, using a turbidimeter can save any water treatment plant with conventional filtration a significant amount of money. In many cases, the cost to purchase/ install the turbidimeters can be recovered in less than a year. Unfortunately, calculation of the cost savings is not always understood.

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