

# COAGULATION OPTIMIZATION USING STREAMING CURRENT DETECTORS AND UV254 ANALYZERS

Both streaming current detectors (SCD) and UV254 analyzers can provide significant benefits for real-time optimization of the coagulation process. However, there are some fundamental differences between the two approaches.

The main difference between SCD and UV254 analyzers for coagulation control is that SCD is typically used to detect the net surface charge in a water sample after coagulant addition<sup>1</sup>, while UV254 is directly related to a water quality parameter, i.e., natural organic matter (NOM), that typically has a significant impact on the coagulant demand<sup>2</sup>. UV254 reacts to changes in the water quality that ultimately determine how much coagulant needs to be added for optimum operation.

Therefore, **SCD provides feedback** information for coagulation control, whereas **UV254 typically provides feedforward** information but can be employed both as **feedforward and feedback**.

The differences described above have the following implications.

- 1 SCD reacts to the coagulant's effectiveness therefore, coagulant strength and type interfere with the results<sup>1</sup>. Moreover, raw water quality affects the performance of SCD<sup>1</sup>. This is quite important and somewhat paradoxical, because sudden changes in raw water quality are exactly when there is a higher need for coagulant dose adjustments, and this seems to be the time when SCD works least reliably. For example, reactions between NOM and the coagulant can potentially increase the SCD signal indicating that the coagulant dose should be lowered, while in reality a higher coagulant dose is required to fully destabilize colloidal particles<sup>3</sup>.
- 2 When conditions resulting in sweep coagulation arise, e.g., when metal coagulants react with the water's natural alkalinity and there is a significant increase in turbidity, the effectiveness of SCD may be limited even further<sup>3</sup>.

Both SCD and UV254 analyzers require an initial period where the relationship between the signal from the instrument and the coagulant dose is being established.

However, in the case of UV254 analyzers the relationship is **more robust and does not typically require adjustments**. For SCD, on the other hand, the set point may need to be adjusted seasonally, monthly, and sometimes even daily.

## REFERENCES:

- <sup>1</sup> AWWA M37 Manual 3rd Edition: Operational Control of Coagulation and Filtration Processes.
- <sup>2</sup> Edzwald, J. K. and Kaminski G. S. 2009 A Practical Method for Water Plants to Select Coagulant Dosing. Journal NEWWA, 11-27.
- <sup>3</sup> Yavich, A. A. and Van De Wege, J. 2013 Chemical feed control using coagulation computer models and a streaming current detector. Water Science & Technology 67 (12), 2814-2821.