

REAL TIME CONTROL OF TRIHALOMETHANES FORMATION AT THE HANAHAN WATER TREATMENT FACILITY

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ABSTRACT

New, stricter EPA limits on trihalomethanes (THMs) pose a serious challenge to water plant operators. THM is a carcinogen that forms when organics in source water are oxidized by chlorination. Facilities in coastal areas and warmer climates like the Hanahan Water Treatment Facility are particularly susceptible to THM formation because their source water often contains high organic concentrations whose species composition varies seasonally. THMs are measured by laboratory instruments that are expensive to buy and operate, therefore, most facilities send water samples to outside labs for analysis on a regular basis. A consequence is that process operators generally do not know THM levels until days later, which can lead to exceedences.

The operators of the 118 MGD Hanahan Facility have developed a supervisory control system to help them manage THMs in a context of their broader operational needs. The THM Controller predicts THM concentration in real-time using a multivariate prediction model called a “virtual sensor”. The model was developed from two years of historical process and laboratory data using an artificial neural network (ANN), a form of machine learning from the field of Artificial Intelligence. This allows the system to automatically adapt to process changes by “retaining” models as new data is collected. In addition to predicting THMs, operators can interact with the system to evaluate different options for controlling the water treatment process. This paper describes the features and performance of the system, and lessons learned from its promotion into daily operations.