1. Control algorithm for caustic shock dosing in sewers

1.1 Background

A drastic pH rise (10-12) allows the suppression of SRB and MA, responsible for sulfide and methane production, respectively. To maintain low production of sulfide, pH shock has to be applied regularly (e.g. weekly)

Further information can be obtained as follows:

- Effects of caustic shock dosing:
  - **Paper:** *O'Gorman, J., Purssell, I. and Iori, G. (2011) Caustic soda washing of a sewer pressure main - Cost-effective removal of biofilm that reduced both odour and methane. Water 38(1), 83-87.*
  - **Paper:** *Gutierrez, O., Park, D., Sharma, K.R. and Yuan, Z. (2009) Effects of long-term pH elevation on the sulfate-reducing and methanogenic activities of anaerobic sewer biofilms. Water Research 43(9), 2549-2557.*

1.2 Control Strategy

1.2.1 Dosing Location

To be effective, this chemical should be dosed at the beginning of the pipe to ensure SRB suppression in the whole pipe.

1.2.2 Dosing rate

Caustic shock aims to increase the pH of the sewage to high levels (pH 10-12) during a short time period. Dosing requirements depend basically on sewage pH, buffer capacity of the wastewater and the desired pH set-point to be reached.

Sewage pH is very dynamic throughout the day, but can be easily monitored on-line using common and inexpensive sensors. Buffer capacity of the wastewater needs to be determined by titration.

1.2.3 Exposure time

Dosing duration to reach certain exposure time needs to be properly timed and will depend on future flows, requiring HRT prediction.

1.2.4 Frequency

The use of on-line sensors such as S::CAN or Odalog will allow to monitor the recovery of SRB activity and the dosing frequency can be adjusted accordingly.

1.2.5 Dosing scheme

The control algorithm for the optimised dosing of NaOH for caustic shock will be composed of a feedforward and a feedback loop. This will allow achieving the required pH in the wet well. Flow measurements will be used to predict future flow and determine dosing duration to ensure a suitable exposure time. Finally, dosing frequency will be controlled using an OdaLog/S::CAN sensor at discharge.

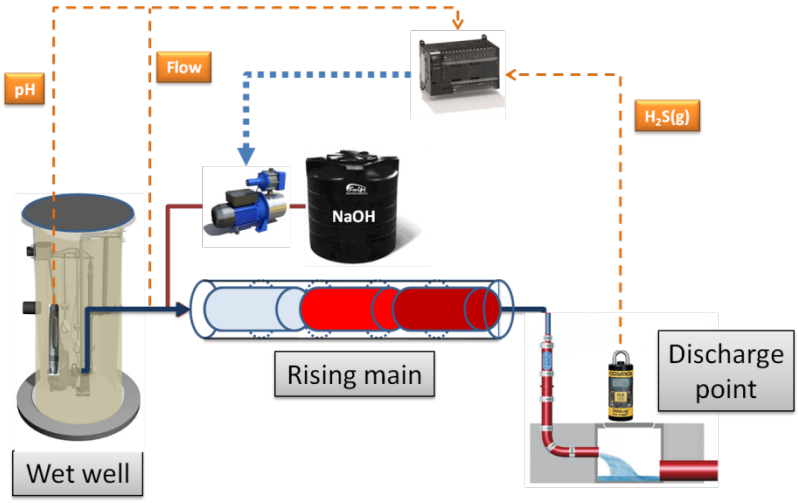

Figure 1. Control algorithm scheme for caustic shock.

1.3 Case studies