



Methanol and Denitrification Filters

C. deBarbadillo
Black & Veatch



Methanol Feed for Denitrification Filters

- 30 years operating experience using methanol in denitrification filters
- Kinetic issues associated with methanol are critical for operation and design of activated sludge systems but less so for fixed film
- Methanol (or alternate carbon source) must be “clean” and consistent



Methanol Feed for Denitrification Filters, Cont'd

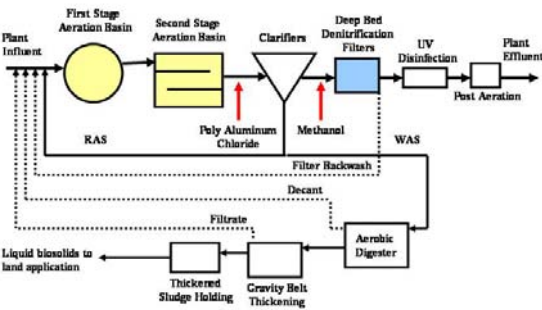
- Control of chemical dosing is even more critical than for activated sludge
 - Last treatment unit before disinfection
 - Must control dosing to avoid BOD breakthrough to effluent
 - Must avoid partial denitrification
 - Meet nitrogen requirements
 - Avoid elevated nitrite going to chlorine disinfection
 - Issues similar for other “stand-alone” tertiary denitrification facilities

Methanol Feed Control

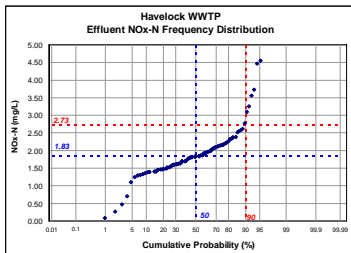
- Manual
- Flow-paced
- Feed-forward
- Feed-forward and Feedback with Effluent Concentration



Havelock WWTP, Havelock, NC



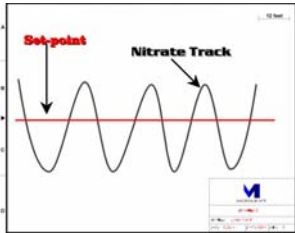
Havelock WWTP Process Performance



- $\text{NO}_3\text{-N}$ reduced from approx. 12 mg/L to about 2 mg/L
- Effluent TN averages about 3 mg/L
 - $\text{NH}_3\text{-N}$ = 0.2 mg/L
 - Org-N = 0.8 mg/L
 - NOx-N = 2 mg/L
- Effluent TP averages about 0.5 mg/L

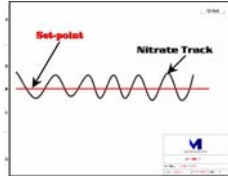
Havelock WWTP Methanol Control

- Methanol Initially Flow Paced
 - Sometimes difficult to meet effluent CBOD limit (3 mg/L)

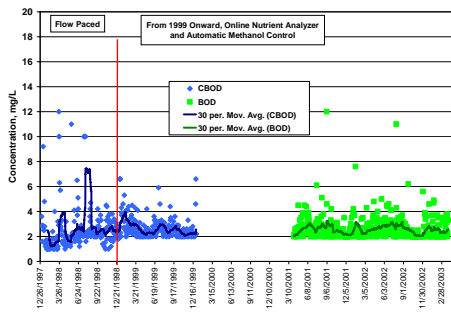


Havelock WWTP Methanol Control, cont'd

- ChemScan analyzer and Tetrapace control system installed in 1998
 - CBOD Std Dev dropped from 4 to 1 mg/L
 - TN Std Dev dropped from 3 to approx 1.8 mg/L
 - Estimated 30% MeOH savings
 - Better matching of dosage
 - Ability to "dial-in" the desired effluent $\text{NO}_3\text{-N}$



Havelock Effluent CBOD and BOD Data, Before and After Methanol Control Upgrades



Additional Control Considerations

- What level of control is needed for a particular installation
- Process parameters to consider
 - NO₃-N only
 - NO₃-N and NO₂-N
 - NO_x-N only
 - NO₃-N, NO₂-N and DO
- Reliability of online monitoring equipment

Questions