Electronic Supplementary Material (ESI) for Environmental Science: Water Research & Technology.

Screen versus cyclone for improved capacity and robustness for sidestream and mainstream deammonification

Tim Van Winckel [a,b,c], Siegfried E. Vlaeminck [a,d], Ahmed Al-Omari [b], Benjamin Bachmann [e], Belinda Sturm [c], Bernhard Wett [f], Imre Takács [g], Charles Bott [h], Sudhir N. Murthy [i] and Haydée De Clippeleir [b]*

[a] *Center of Microbial Ecology and Technology (CMET), Faculty of Bioscience Engineering, Ghent University, Gent, Belgium*

[b] *District of Columbia Water and Sewer Authority, Blue Plains Advanced Wastewater Treatment Plant, 5000 Overlook Ave, SW Washington, DC 20032, USA*

[c] *Department of Civil, Environmental and Architectural engineering, The University of Kansas, KS, USA*

[d] *Research Group of Sustainable Energy, Air and Water Technology, Department of Bioscience Engineering, University of Antwerp, Antwerpen, Belgium*

[e] *Department of Microbiology; University of Innsbruck, Austria*

[f] *ARA consult GmbH, Austria*

[g] *Dynamita SARL, France*

[h] *Hampton Roads Sanitation District, VA, USA*

[i] *New Hub, VA, USA*

* *Corresponding author:* siegfried.vlaeminck@uantwerpen.be

Supplemental E:

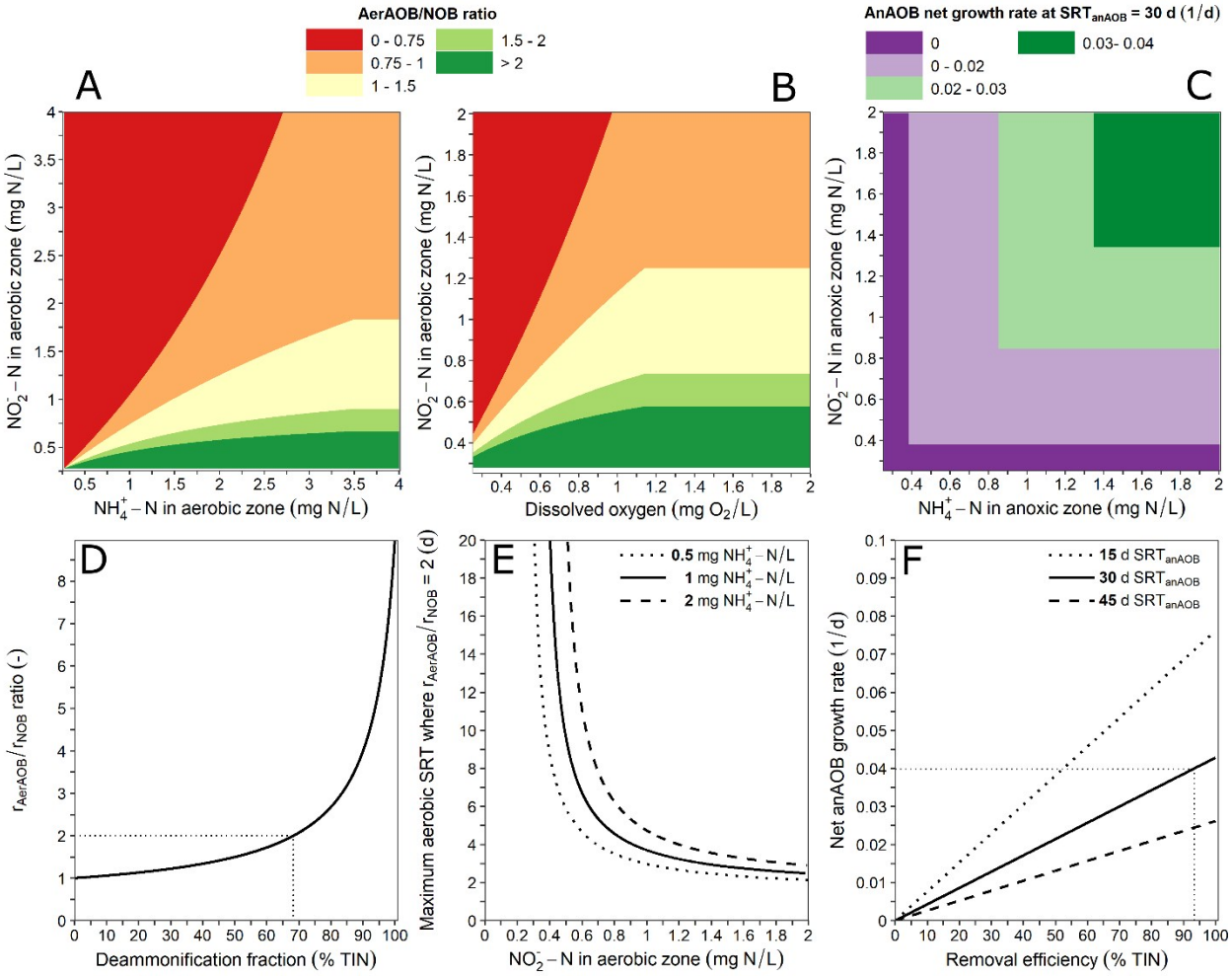

Figure E1. (A/B) Ratio of intrinsic AerAOB over NOB removal rates as a function of the average concentrations in the reactor's aerobic zones of ammonium and nitrite (A; DO = 1.5 mg O_2/L) and DO and nitrite (B; ammonium = 2 mg N/L**)** without bioaugmentation from sidestream to mainstream. **(C)** The net growth rate of AnAOB given an AnAOB-specific SRT of 30 days without bioaugmentation. **(D)** Relationship between the percentage of TIN removed through deammonification and the AerAOB/NOB rates ratio in the system. **(E)** Minimum net AnAOB growth rate required for adequate deammonification given a certain TIN removal for three different AnAOB specific SRT. **(F)** Maximum aerobic SRT where the ratio of AerAOB over NOB removal rates equaled 2 in function of the average nitrite and ammonium in the aerobic zone.

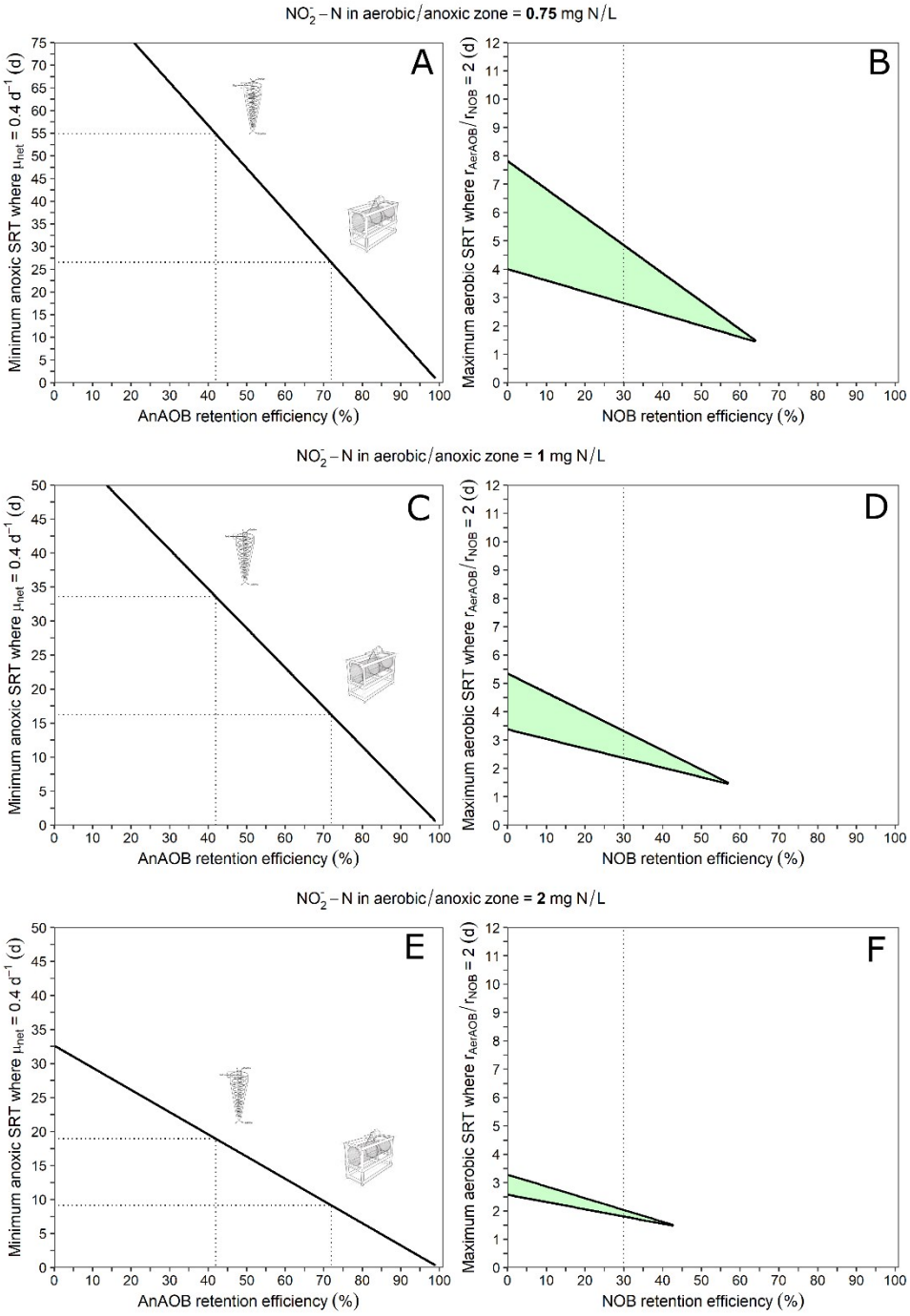

Figure E2. (A/C/E) Minimum anoxic SRT required to meet the minimum 0.04 d^{-1} AnAOB net growth rate criterion in function of the AnAOB retention efficiency for an average nitrite residual of 0.75 **(A)**, 1 **(C)**, and 2 **(E)** mg N/L in the anoxic zone without bioaugmentation from sidestream to mainstream. **(B/D/F)** The spread of aerobic SRT where can be operated given an AerAOB/NOB ratio above or equal 2 as a function of the NOB retention efficiency for an

average nitrite residual of 0.75 **(B)**, 1 **(D)**, and 2 **(F)** mg N/L in the anoxic zone. The upper boundary of the zone was given by the aerobic SRT where the rate ratio is 2, while the lower boundary is given by the washout SRT of NOB.