

# Accepted Manuscript

Estimating removals of contaminants of emerging concern from wastewater treatment plants: The critical role of wastewater hydrodynamics

Zeina Baalbaki, Tamanna Sultana, Chris Metcalfe, Viviane Yargeau



PII: S0045-6535(17)30433-2

DOI: [10.1016/j.chemosphere.2017.03.070](https://doi.org/10.1016/j.chemosphere.2017.03.070)

Reference: CHEM 18988

To appear in: *ECSN*

Received Date: 8 June 2016

Revised Date: 18 February 2017

Accepted Date: 16 March 2017

Please cite this article as: Baalbaki, Z., Sultana, T., Metcalfe, C., Yargeau, V., Estimating removals of contaminants of emerging concern from wastewater treatment plants: The critical role of wastewater hydrodynamics, *Chemosphere* (2017), doi: [10.1016/j.chemosphere.2017.03.070](https://doi.org/10.1016/j.chemosphere.2017.03.070).

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

1 Estimating removals of contaminants of emerging concern from  
2 wastewater treatment plants: The critical role of wastewater  
3 hydrodynamics

4 Zeina Baalbaki <sup>a</sup>, Tamanna Sultana <sup>b</sup>, Chris Metcalfe <sup>b</sup>, Viviane Yargeau <sup>a,\*</sup>

5 <sup>a</sup> Department of Chemical Engineering, McGill University, 3610 University St., Montreal, QC, H3A 0C5, Canada

6 <sup>b</sup> Water Quality Centre, Trent University, 1600 West Bank Drive Peterborough, ON, K9J 7B8, Canada

7 \*Corresponding author. Tel.: +1 514 398 2273; fax: +1 514 398 6678; E-mail address: viviane.yargeau@mcgill.ca (V. Yargeau).

8 **Abstract**

9 Accurate data are needed to evaluate the capacity of wastewater treatments plants (WWTPs)  
10 to remove contaminants of emerging concern (CECs). The variability of CEC removals  
11 reported in the literature has raised questions about the methods used to estimate removals. In  
12 this study, we used the recently proposed “fractionated approach” to account for the influence  
13 of hydrodynamics in WWTPs and applied this method for estimating removals of 23 target  
14 CECs. Data on the conductivity and temperature of wastewater at two WWTPs were used to  
15 determine the hydraulic model that best described the flow regime of treatment units.  
16 Composite samples (24-h) were collected at different stages of treatment over successive  
17 days. The concentrations of the target compounds in wastewater were determined by liquid  
18 chromatography with mass spectrometry. Different hydraulic models were necessary to  
19 define the hydrodynamics at the two WWTPs, resulting in different load fractions to be used  
20 in calculations of removals. For WWTP A, that has a primary clarifier, all target CECs,  
21 except triclosan, were poorly removed during this step at efficiencies <30%. On the other  
22 hand, the activated sludge treatment unit at both WWTPs removed most target CECs at  
23 >70%. This study expanded the application of the fractionated approach to compare the  
24 hydraulics of two treatment trains of different configurations, including primary and  
25 secondary treatment. It demonstrated the sensitivity of the method to account for variations  
26 between the different treatment units. Reliable removals of an extended list of CECs in  
27 primary and secondary treatment were also provided in this study.

28

29 **Keywords:** Micropollutants, Fractionated approach, Hydraulic model, Removal efficiency, Activated sludge,  
30 Primary clarification

Download English Version:

<https://daneshyari.com/en/article/5747267>

Download Persian Version:

<https://daneshyari.com/article/5747267>

[Daneshyari.com](https://daneshyari.com)