Desalination and Water Treatment
www.deswater.com
32 (2011) 145–152
August
1944-3994 / 1944-3986 © 2011 Desalination Publications. All rights reserved.
doi: 10.5004/dwt.2011.2691

Nitrous oxide emissions from a typical northern Chinese municipal wastewater treatment plant

Jinhe Wang[a,b], Jian Zhang[a]*, Jing Wang[c], Pengyu Qi[a], Yangang Ren[a], Zhen Hu[a]

[a]*Shandong Provincial Key Laboratory of Water Pollution Control and Resource Reuse, School of Environmental Science and Engineering, Shandong University, Jinan 250100, PR China*
Tel. +86 (531) 88363015; Fax +86 (531) 88364513; email: zhangjian00@sdu.edu.cn
[b]*School of Municipal and Environmental Engineering, Shandong Jianzhu University, Fengming Road, Jinan 250101, PR China*
[c]*Everbright Water(Jinan)Limited, Jinan 250032, PR China*

Received 16 July 2010; Accepted in revised form 18 December 2010

ABSTRACT

Nitrous oxide (N_2O) emissions from a typical full-scale tertiary municipal wastewater treatment plant (WWTP) in northern China were investigated during spring and summer of 2010. Results showed that the major emission sources of N_2O performed the following descending order: oxic tanks, final clarifier tanks, anoxic tanks, sludge concentration tanks and anaerobic tanks. The total annual N_2O flux from the oxic tanks was the highest and accounted for the majority of total N_2O emissions of this WWTP. The emission factors derived from the field measurements included per capita emissions of 1.73–2.19 g of N_2O person^{-1} y^{-1} and flow based emissions of 2.37×10^{-5}–3.01×10^{-5} g of N_2O (L of wastewater)$^{-1}$. The N_2O emissions accounted for approximately 0.10%–0.13% of the total nitrogen removed in this WWTP. The most significant factors influencing N_2O emissions in this plant were dissolved oxygen concentration and nitrite concentration in the oxic tanks.

Keywords: Wastewater treatment plant; Nitrous oxide; Greenhouse gas emission; Nitrification; Denitrification

* Corresponding author.