

# Accepted Manuscript

Evaluating the stable isotopic composition of phosphate oxygen as a tracer of phosphorus from waste water treatment works

Daren C. Goody, Michael J. Bowes, Dan J. Lapworth, Angela L. Lamb, Peter J. Williams, Rob J. Newton, Ceri L. Davies, Ben W.J. Surridge

PII: S0883-2927(18)30147-1

DOI: [10.1016/j.apgeochem.2018.05.025](https://doi.org/10.1016/j.apgeochem.2018.05.025)

Reference: AG 4102

To appear in: *Applied Geochemistry*

Received Date: 14 February 2018

Revised Date: 29 May 2018

Accepted Date: 31 May 2018

Please cite this article as: Goody, D.C., Bowes, M.J., Lapworth, D.J., Lamb, A.L., Williams, P.J., Newton, R.J., Davies, C.L., Surridge, B.W.J., Evaluating the stable isotopic composition of phosphate oxygen as a tracer of phosphorus from waste water treatment works, *Applied Geochemistry* (2018), doi: 10.1016/j.apgeochem.2018.05.025.

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 **Evaluating the Stable Isotopic Composition of Phosphate Oxygen as a** 2 **Tracer of Phosphorus from Waste Water Treatment Works**

3 Daren C Gooddy<sup>a\*</sup>, Michael J Bowes<sup>b</sup>, Dan J Lapworth<sup>a</sup>, Angela L Lamb<sup>c</sup>, Peter J Williams<sup>a</sup>, Rob J  
4 Newton<sup>d</sup>, Ceri L Davies<sup>ef</sup> and Ben WJ Surridge<sup>e</sup>

5 <sup>a</sup>*British Geological Survey, Maclean Building, Wallingford, Oxfordshire, OX10 8BB, UK*

6 <sup>b</sup>*Centre for Ecology & Hydrology, Maclean Building, Wallingford, Oxfordshire, OX10 8BB, UK*

7 <sup>c</sup>*NERC Isotope Geosciences Laboratory, British Geological Survey, Keyworth, Nottingham, NG12 5GG, UK*

8 <sup>d</sup>*School of Earth and Environment, University of Leeds, Leeds, LS2 9JT, UK*

9 <sup>e</sup>*Lancaster Environment Centre, Lancaster University, Lancaster, LA1 4YQ, UK*

10 <sup>f</sup>*Bath Spa University, Newton Park, Newton St Loe, Bath, BA2 9BN, UK*

11

12 \*Corresponding author.

13 E-mail address [dcg@bgs.ac.uk](mailto:dcg@bgs.ac.uk) (D.C. Gooddy)

14

## 15 **Abstract**

16 Eutrophication is a globally significant challenge facing freshwater ecosystems and is closely  
17 associated with anthropogenic enrichment of phosphorus (P) in the aquatic environment. Phosphorus  
18 inputs to rivers are usually dominated by diffuse sources related to farming activities and point  
19 sources such as waste water treatment works (WwTW). The limited availability of inherent labels for  
20 different P sources has constrained understanding of these triggers for eutrophication in natural  
21 systems. There have been substantial recent advances in the use of phosphate oxygen isotopes  
22 ( $\delta^{18}\text{O}_{\text{PO}_4}$ ) as a way of understanding phosphate sources and processing. Results from all previous  
23 studies of the  $\delta^{18}\text{O}_{\text{PO}_4}$  composition of WwTW effluent and septic tanks are combined together with  
24 significant new data from the UK to assess  $\delta^{18}\text{O}_{\text{PO}_4}$  compositions in waste water sources. The overall  
25 average  $\delta^{18}\text{O}_{\text{PO}_4}$  value is 13.9‰, ranging from 8.4 to 19.7‰. Values measured in the USA are much  
26 lower than those measured in Europe. A strong positive correlation exists between  $\delta^{18}\text{O}_{\text{PO}_4}$  and  
27  $\delta^{18}\text{O}_{\text{H}_2\text{O}}$ , suggesting biologically-mediated exchange between the water molecules and the phosphate

Download English Version:

<https://daneshyari.com/en/article/8863072>

Download Persian Version:

<https://daneshyari.com/article/8863072>

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