

The impact of biofilms upon surfaces relevant to an intermediate level waste geological disposal facility under simulated near field conditions.

Christopher J. Charles ¹, Simon P. Rout ¹, Andrew P. Laws ², Brian R. Jackson ³, Sally A. Boxall ³, and Paul N. Humphreys ^{1,*}

¹ Department of Biological Sciences, School of Applied Sciences, University of Huddersfield, Queensgate, Huddersfield HD1 3DH, UK; christopher.charles@hud.ac.uk (C.J.C.); s.rout@hud.ac.uk (S.P.R.).

² Department of Chemical Sciences, School of Applied Sciences, University of Huddersfield, Queensgate, Huddersfield HD1 3DH, UK; a.p.laws@hud.ac.uk (A.P.L.).

³ Bio-Imaging Facility, School of Molecular and Cellular Biology, Faculty of Biological Sciences, University of Leeds, Leeds LS2 9JT, UK; b.r.jackson@leeds.ac.uk (B.R.J.); s.a.boxall@leeds.ac.uk (S.A.B.).

* Correspondence: p.n.humphreys@hud.ac.uk; (P.N.H.) Tel.: +44-1484-472771.

Supplemental Material

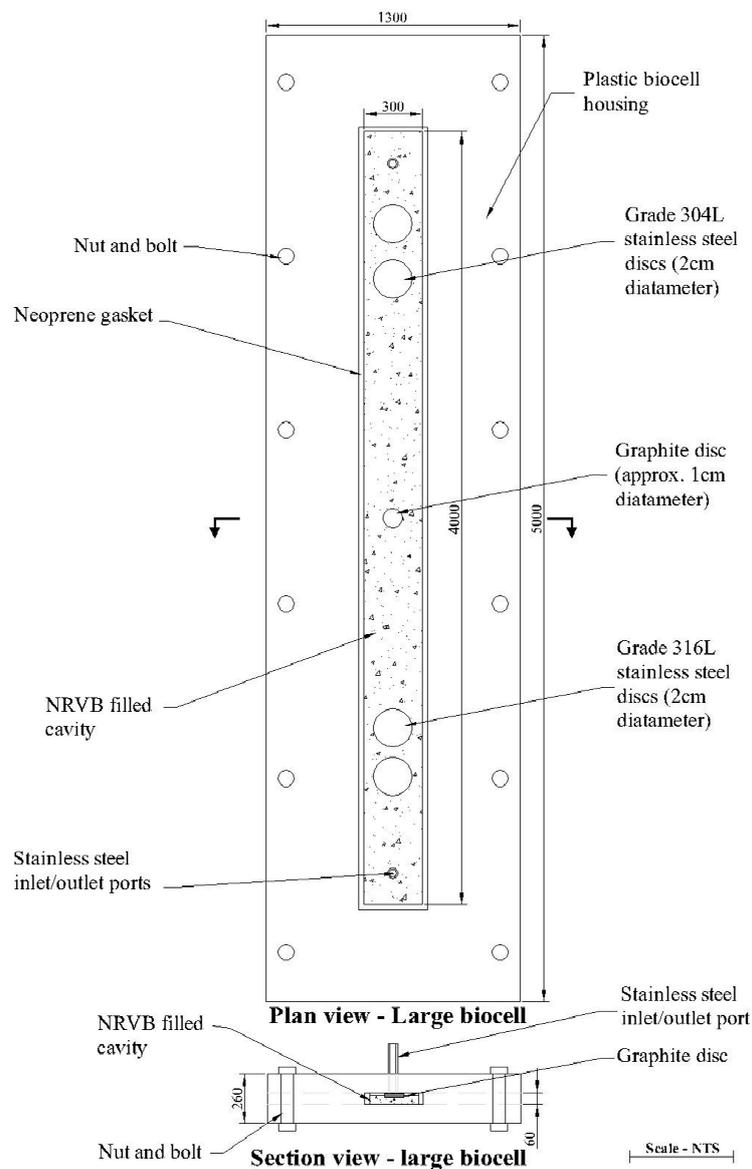
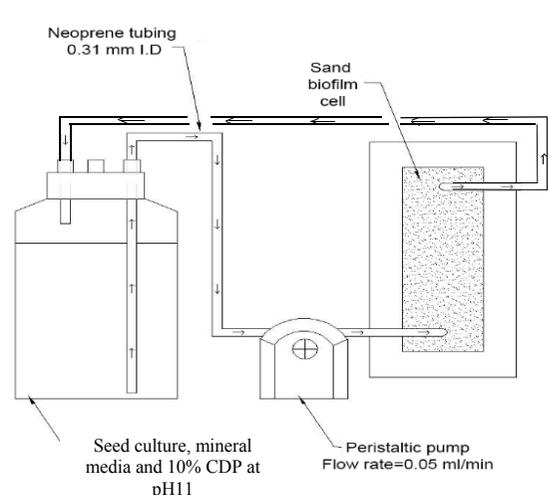


Figure S1. Diagram of a large biocell unit used to house NRVB column.

(A) Biofilm is established via recirculation at pH 11.



(B) Single pass circulation of 10% CDP in mineral media at pH 11, 12 and 13.

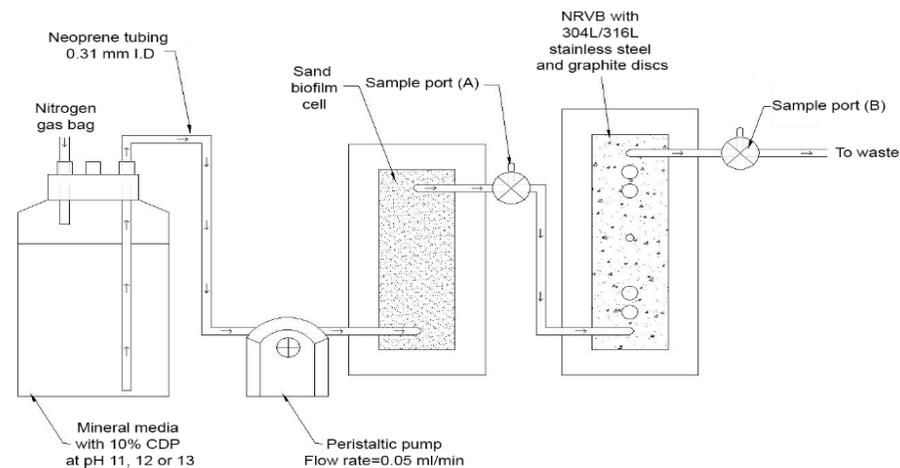


Figure S2. Reaction set up. Biofilm was established on the sand column by recirculation of a flocculate forming seed culture for 10 weeks. The sand column was then challenged with 10% mineral media at pH 11 and flowed through into the NRVB column (B). The sand was then replaced with fresh sand and the process of establishment of biofilm at pH 11 repeated, before being challenged with 10 % CDP and mineral media at pH 12 and 13.

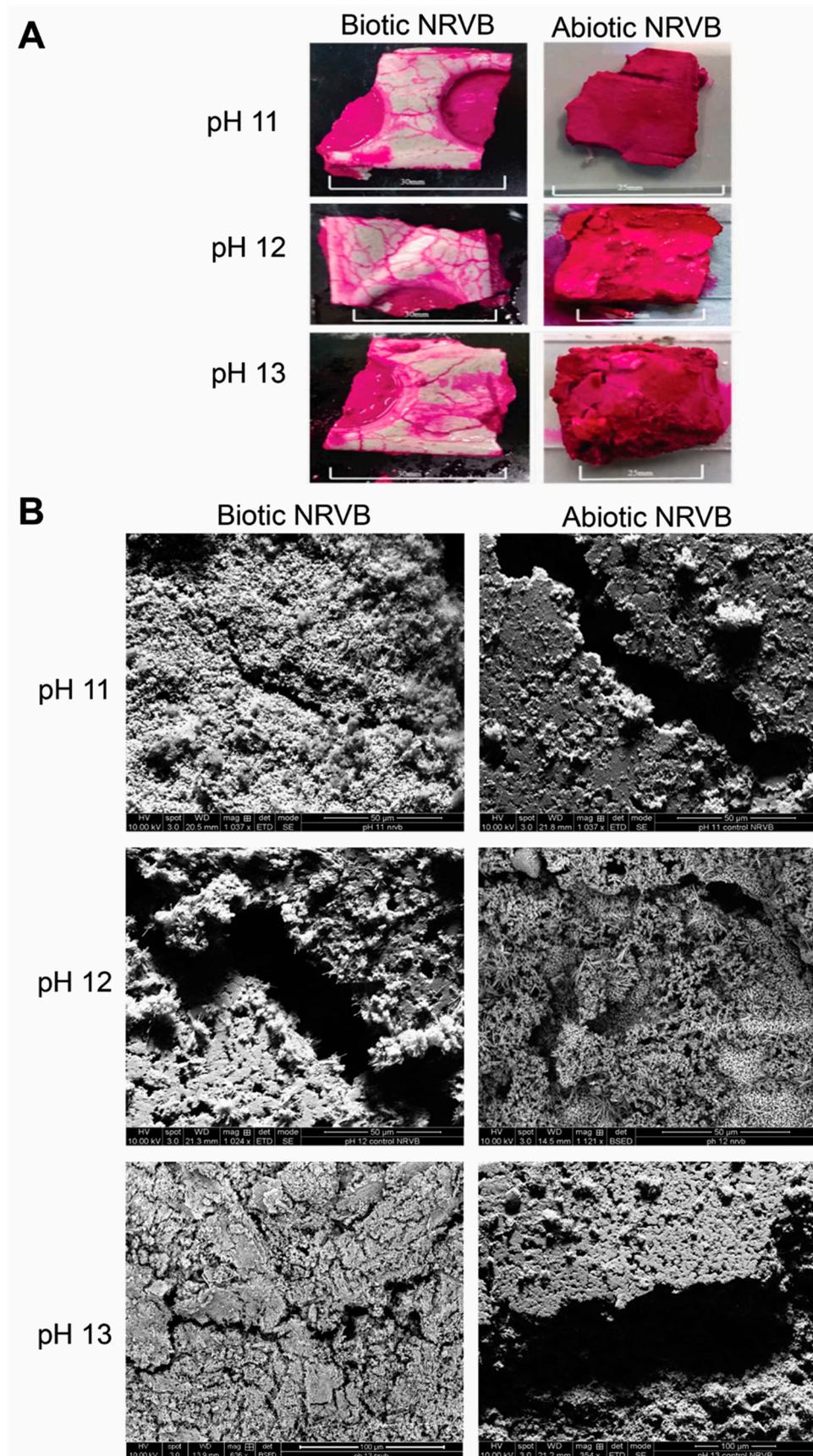


Figure S3. Carbonation of NRVB surfaces. Areas of reduced pH (white areas) were observed in all biotic samples following phenolphthalein staining (A), SEM imaging (B) of these areas of reduced pH indicated modifications to the NRVB surfaces at influent pH values of pH 11, 12 and 13.

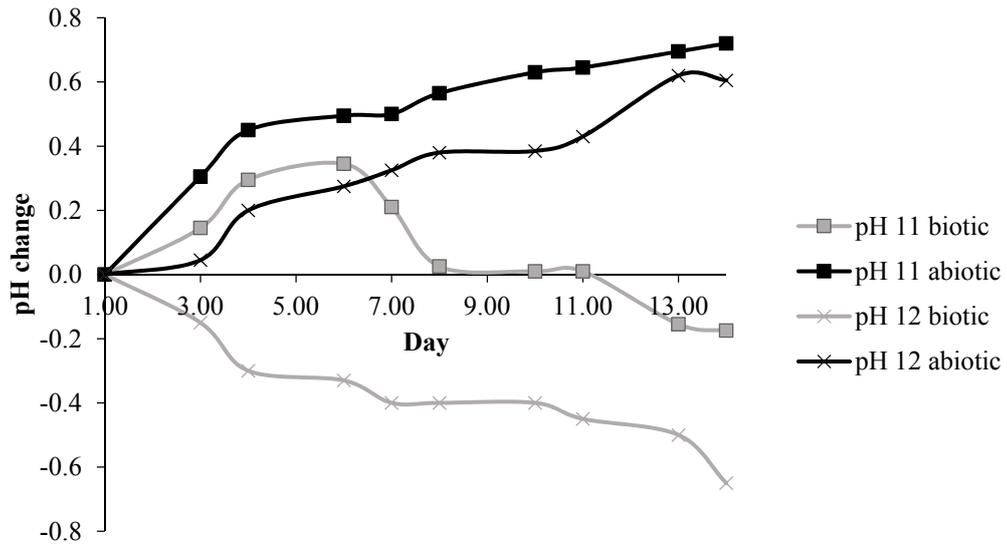


Figure S4. pH evolution at outlet of NRVB column.

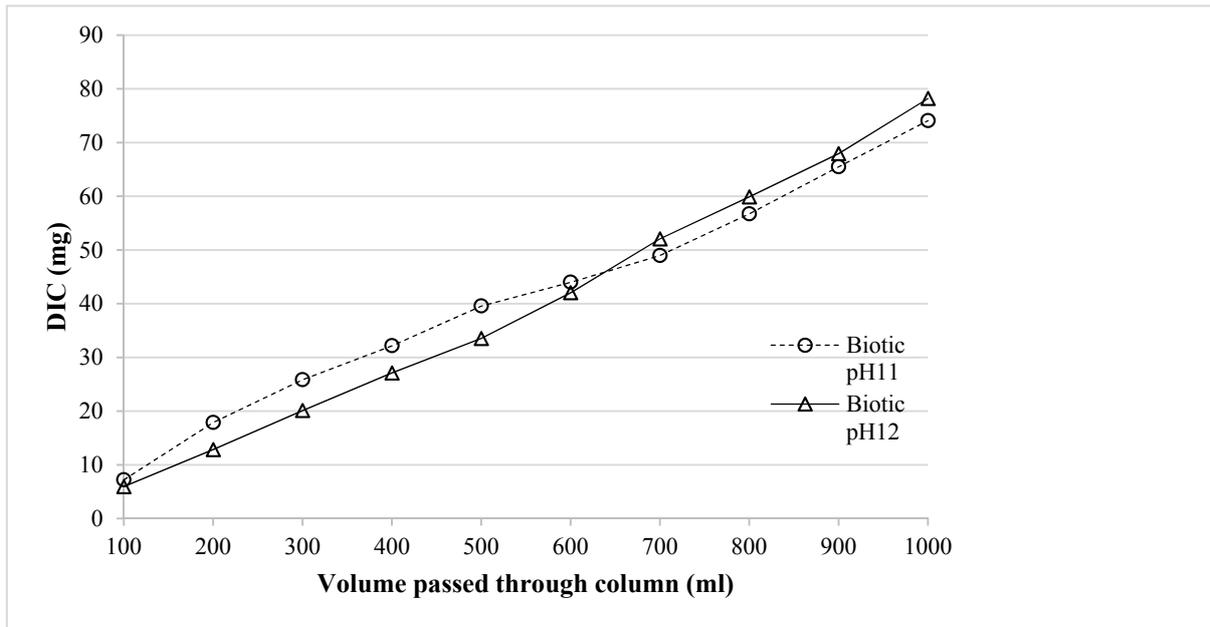


Figure S5. Accumulation of dissolved inorganic carbon at outlet port.