

Start-up and performance of a full scale passive system including biofilters for the treatment of Fe, As and Mn in a neutral mine drainage

Jérôme Jacob (BRGM), Catherine Jouliau (BRGM), Fabienne Battaglia-Brunet (BRGM)

Supplementary Material

Table S1. Target genes, primers and qPCR programs

Target gene, specificity	Primers (5'-3' sequence)	qPCR Program	Reference
16S rRNA gene, <i>Bacteria</i>	341F (5'-CCTACGGGAGGCAGCAG-3') 534R (5'-ATTACCGCGGCTGCTGGCA-3')	95°C for 3 min 35 cycles of : 95°C for 15s ; 60°C for 30s ; 72°C for 30s; 80°C for 30s 0.5°C temperature increment every 10s, from 65°C to 95°C	Michel et al. (2021)
<i>aioA</i> gene, AsIII-oxidising bacteria	aoxBM4-1F (5'-GCCGGCGGGGNTWYGARRAYA-3') aoxBM2-1R (5'-GGAGTTGTAGGCGGGCCKRTTTRTGDAT_3')	3 min 95°C 50 cycles of : 95°C for 10s ; 54°C for 20s ; 72°C for 30s; 80°C for 30s 0.5°C temperature increment every 10s, from 65°C to 95°C	Fernandez-Rojo et al. (2017)

Michel, C., Baran, N., André, L., Charron, M., Jouliau, C., 2021. Side effects of pesticides and metabolites in groundwater: Impact on denitrification. *Front. Microbiol.* 12, 662727.

<https://doi.org/10.3389/fmicb.2021.662727> Fernandez-Rojo, L., Héry, M., Le Pape, P., Braungardt, C., Desoeuvre, A., Torres, E., Tardy, V., Resongles, E., Laroche, E., Delpoux, S., Jouliau, C., Battaglia-Brunet, F., Boisson, J., Grapin, G., Morin, G., Casiot, C., 2017. Biological attenuation of arsenic and iron in a continuous flow bioreactor treating acid mine drainage (AMD). *Wat. Res.* 123, 594-606.

<https://doi.org/10.1016/j.watres.2017.06.059>

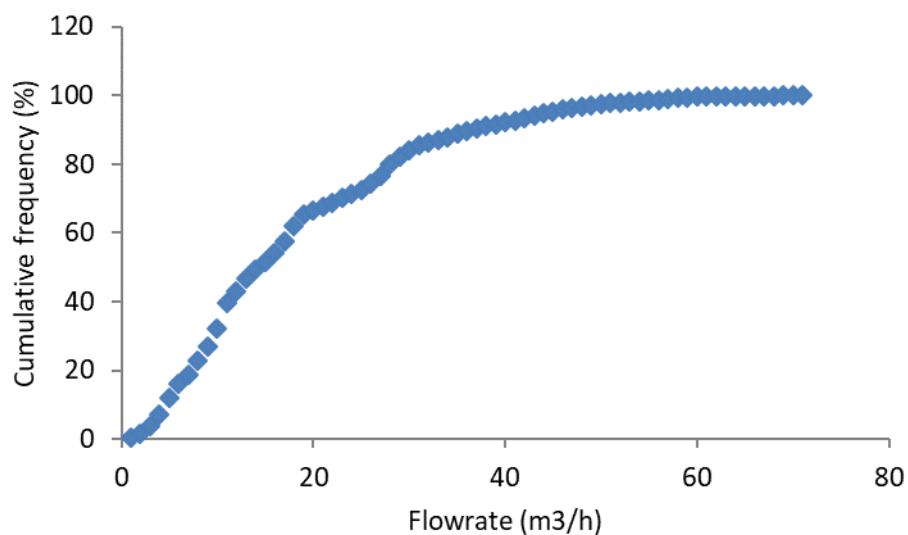


Figure S1. Cumulative frequency (%) of Lopérec mine water flowrate

Table S2. Lopérec treatment system removal performance (dissolved)

Compartment	Parameters (% removal of dissolved species)	2017	2018
Settling pond	Fe	95	99
	As	97	96
	Mn	13	14
Biofilter	Fe	-	-
	As	-	-
	Mn	59	66

Table S3. Comparison of the sludge composition between the two steps of Loperec treatment system

Parameters (%)	Settling pond	Biofilter
Al ₂ O ₃	1.75	0,97
Corga		0.52
CaO	1.36	2.73
Ctotal		1.03
Fe ₂ O ₃	52	46.7
K ₂ O	0.286	0.14
MgO	0.45	0.53
MnO	4.18	15.3
Na ₂ O	<0,20	<0.20
P ₂ O ₅	0.766	0.77
SiO ₂	14.7	8.7
Total sulphur		0.05
TiO ₂	0.105	0.09
Loss on Ignition	23.3	24

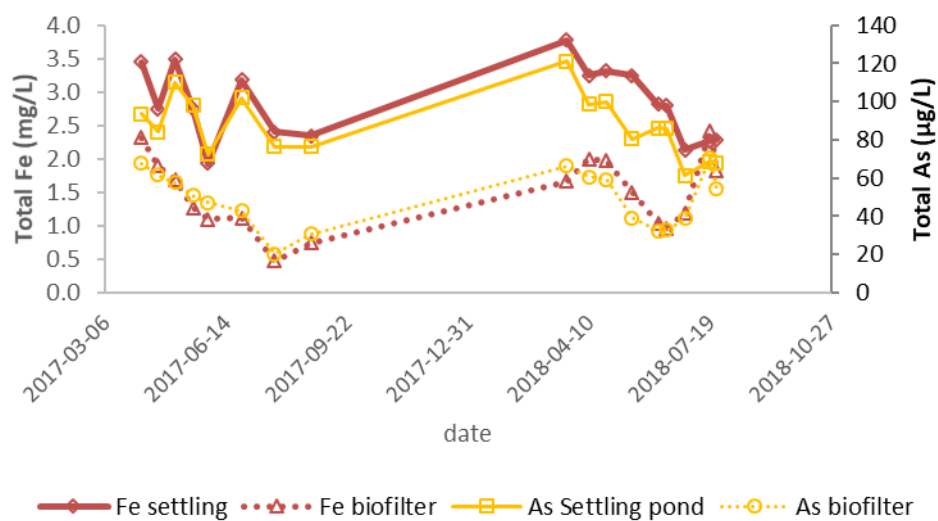


Figure S2. Total Fe and As in settling pond and biofilter

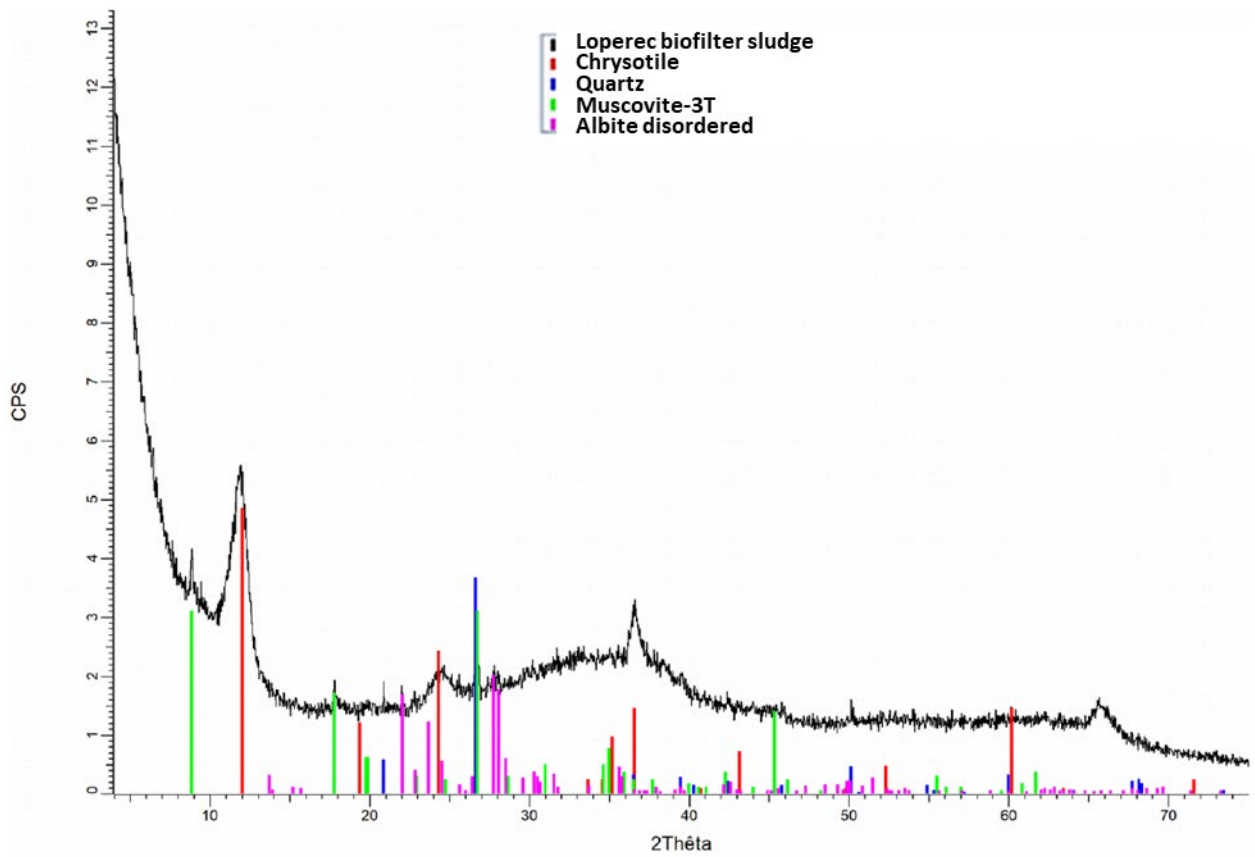


Figure S3. XRD spectrum of the sludge from the biofilter (black curve). Main minerals are chrysotile (red bars), quartz (blue bars), muscovite (green bars) and albite (pink bars).