

Acid Mine Water Flows Case Study

A reduction in metal pollutants of 90%

Acid mine waters flow from a site previously a coal mine. The site was re-vegetated, but the acid mine waters still flow from the site. These flows are rich in metals, minerals and sludges. The acidity of the flows are around 4.2pH.



The flows emerge and are settled in a lagoon.

The flows then flow through a vertical flow reedbed.





Last year the reeds were fully grown, with seed heads forming on most stems.



The results from samples taken December 2013 are as follows.

Certificate of Analysis



Report Number: **WAK/973080/2013**
Laboratory Number: **13824854**

Issue **2**
Sample **1** of **2**

Sample Source: **Barnsley MBC**
Sample Point Description:
Sample Description: **DODWORTH 1**
Sample Matrix: **River waters**
Sample Date/Time: **09 December 2013 11:59**
Sample Received: **09 December 2013**
Analysis Complete: **23 December 2013**

Test Description	Result	Units	Analysis Date	Accreditation	Method
Aluminium, Total as Al	0.812	mg/l	13/12/2013	Y Cov	WAS049
Cadmium , Total as Cd	<0.0006	mg/l	17/12/2013	Y Cov	WAS049
Chromium , Total as Cr	<0.0020	mg/l	13/12/2013	Y Cov	WAS049
Copper, Total as Cu	<0.009	mg/l	13/12/2013	Y Cov	WAS049
Iron , Total as Fe	1.82	mg/l	13/12/2013	Y Cov	WAS049
Nickel , Total as Ni	0.042	mg/l	17/12/2013	Y Cov	WAS049
Zinc, Total as Zn	0.05	mg/l	17/12/2013	Y Cov	WAS049
pH	6.6	pH units	10/12/2013	Y Cov	WAS039
Conductivity- Electrical 20C	4330	uS/cm	10/12/2013	Y Cov	WAS039
Solids, Tot Dissolved 180 DegC	164	mg/l	19/12/2013	N Cov	WAS010
Dissolved Oxygen concentration	7.9	mg/l	10/12/2013	Y Cov	WAS052
Dissolved Oxygen (Saturation)	87.1	%	11/12/2013	N Cov	None

Analyst Comments for 13824854: No Analyst Comment

Accreditation Codes: Y = UKAS / ISO17025 Accredited, N = Not UKAS / ISO17025 Accredited, M = MCERTS
Analysed at: Cov = Coventry(DV4 9GU), Run = Runcorn(WA7 1SL), S = Subcontracted, Trib = Subcontracted to Trowbridge(BA14 0XD), Wak = Wakefield(WF5 9TG)
For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. The LOD for the Legionella analysis will increase where the volume analysed is <1000g (1g is approximately equivalent to 1ml for sample volume analysed).
I/S=Insufficient sample For silt/sludge samples: AR=As received, DW=Dry weight.

Signed:

Name: **J. Fell**

Date: **23 December 2013**

Title: **Chemistry Operations Manager**

ALS Environmental Ltd

Unit 11, Silkwood Park, Janes Hill, Off Albert Drive, Wakefield, WF5 9TG
Tel:+44 (0)1924 818100 Fax:+44 (0)1924 818101

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Certificate of Analysis



Report Number: **WAK/973080/2013**
 Laboratory Number: **13824855**


Issue **2**
 Sample **2** of **2**

Sample Source: **Barnsley MBC**
 Sample Point Description:
 Sample Description: **DODWORTH 2**
 Sample Matrix: **River waters**
 Sample Date/Time: **09 December 2013 12:07**
 Sample Received: **09 December 2013**
 Analysis Complete: **23 December 2013**

Test Description	Result	Units	Analysis Date	Accreditation	Method
Aluminium, Total as Al	42.7	mg/l	23/12/2013	Y Cov	WAS049
Cadmium , Total as Cd	<0.0060	mg/l	23/12/2013	Y Cov	WAS049
Chromium , Total as Cr	<0.0200	mg/l	23/12/2013	Y Cov	WAS049
Copper, Total as Cu	<0.090	mg/l	23/12/2013	Y Cov	WAS049
Iron , Total as Fe	<2.30	mg/l	23/12/2013	Y Cov	WAS049
Nickel , Total as Ni	0.621	mg/l	23/12/2013	Y Cov	WAS049
Zinc, Total as Zn	0.736	mg/l	23/12/2013	Y Cov	WAS049
pH	3.9	pH units	14/12/2013	Y Cov	WAS039
Conductivity- Electrical 20C	4270	uS/cm	10/12/2013	Y Cov	WAS039
Solids, Tot Dissolved 180 DegC	4410	mg/l	19/12/2013	N Cov	WAS010
Dissolved Oxygen concentration	7.6	mg/l	10/12/2013	Y Cov	WAS052
Dissolved Oxygen (Saturation)	83.8	%	11/12/2013	N Cov	None

Analyst Comments for 13824855: Integrity breach between Electrical Conductivity and Total Dissolved Solids, results within 10%

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 Analysed at: Cov = Coventry(CV4 9GU), Run = Runcorn(WA7 1SL), S = Subcontracted, Trib = Subcontracted to Trowbridge(BA14 0XD), Wak = Wakefield(WF5 9TG).
 For Microbiological determinands 0 or ND=Not Detected. For Legionella ND=Not Detected in volume of sample filtered. The LOD for the Legionella analysis will increase where the volume analysed is <1000g (1g is approximately equivalent to 1ml for sample volume analysed).
 IS=Insufficient sample For soil/sludge samples: AR=As received, DW=Dry weight.

Signed:  Name: **J. Fell** Date: **23 December 2013**
 Title: **Chemistry Operations Manager**

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The pH of the inflow was 3.9 and 6.6 for the outflow. The reduction in metals is 90%. The full system included a second reedbed. We re-built this second system just before Christmas. Once we get some good weather, we can get some photos.