

Resolving the impacts of mining

# Easthouses Great Seam Borehole Survey

Produced by: Megan Nicholson Checked by John Leyland

# **Summary**

A CCTV survey was carried out on the Easthouses Great Seam Borehole (site ref 787.1) on the 11 July 2019. In addition to conductivity and temperature profiling, a calliper survey (which incorporates natural gamma) and sampling of water in the borehole was undertaken.

Immediately prior to the survey, water level was manually dipped at 47.84mBGL. This matched the water level observed by the CCTV survey at 47.8mBGL. The conductivity and temperature logs further confirm the water level.

The borehole was drilled in 2013 to workings in the Great Seam at a depth of 229.5 mBGL. Final completion details were:

- 168mm diameter solid casing from surface to 217 mBGL
- Open hole (unlined) from 217 mBGL to 229.5 mBGL

It was intended to take the water sample at 228 mBGL, 1 metre above the base of the borehole. On site it was decided to take the water sample at 225 mBGL, this decision was based on the casing level within the borehole, along with results from the conductivity and temperature probe.

The samples were tested in a laboratory at SOCOTEC Ltd (See laboratory UKAS report reference W28\_7271).

The calliper survey confirmed an average casing internal diameter of 160.8 mm. The survey showed no significant damage to the casing with a consistent diameter until approximately 210 mBGL, where the diameter appears to decrease in the last section of the casing. The open hole section showed a variable diameter, reaching a maximum of 338 mm at the bottom.

### Visual observations

The downhole CCTV camera survey was conducted to assess borehole condition, to identify potential obstructions and to provide a subjective assessment of water quality and/or stratification (as indicated by visibility/clarity). Key observations are included below:

- No visible water quality differences at both step changes (150 and 210 mBGL);
- Minor debris/suspended solids visible from 150 mBGL, the amount of debris increases gradually with depth;

- There is a clear reduction in clarity from 209 mBGL, visibility gradually deteriorates before being completely lost below213 mBGL: and
- Debris accumulation appears to have caused a reduction of the borehole diameter and possibly an obstruction at 211 mBGL.

# **Physical and Chemical Results**

Water was encountered in the borehole at approximately 47.84 mBGL. The sample was taken approximately 5 m above the base of the borehole at 225 mBGL.

Summaries of chemical results are presented in **Table 1**, **Figure 4**, **Figure 5**, **Figure 6** and **Figure 7**.

The conductivity data shows two step changes in the borehole at approximately 150 mBGL and 210 mBGL (shown in **Figure 1** and **Figure 4**).

The temperature increases by approximately 5°C throughout the hole, with further increases at the two step changes.

Table 1: Summary of selected laboratory results on the 4 samples taken during the survey

Parameter	Sample Depth (mBGL)
Parameter	225
Iron (mg/l) Total	85.3
Iron (mg/l) Dissolved	66.3
рН	6.4
Sulphur as SO <sub>4</sub> (mg/l) Dissolved	2240
Chloride (mg/l)	68
Alkalinity as CaCO₃ (mg/l)	305
Electrical Conductivity (μS/cm at 25°C)	2910
On-site Temperature (°C)	14.5

Full results of laboratory analysis are presented in SOCOTEC laboratory UKAS report reference W28\_7271 included as appendix B.

# **Comparison to Previous Surveys**

The average casing internal diameter of the 2019 survey was 160.8 mm, the average of the 2016 survey was 162.4 mm. The calliper survey results were broadly similar to the 2016 results, both of the surveys showed a relatively consistent diameter throughout (**Figure 2**).

The main chemistry changes between the two surveys can be summarised as:

- The iron concentrations have increased by ~57 mg/L since the 2016 survey;
- The sulphate concentrations have decreased by ~500 mg/L since the 2016 survey;
- The chloride concentrations have increased by ~20 mg/L since the 2016 survey;

• The alkalinity results are within ~20 mg/L difference between the two surveys.

The temperature results from the 2019 survey show a ~1°C increase when compared to the 2016 survey (Figure 2). Overall, throughout the borehole the temperature profile remains the same as that of the 2016 survey, showing a gradual increase of approximately 4°C with borehole depth (**Figure 2**).

The conductivity results from the 2019 survey show two main step changes throughout the borehole, at 150 mBGL and 210 mBGL. This differs from the 2016 survey, which shows three main step changes at 170 mBGL, 190 mBGL and 210 mBGL (**Figure 3**).

The mine water level in the Easthouses mining system has risen by approximately 12m between 2016 and 2019 as measured in the Easthouses Great Seam Borehole. The water level at time of survey is indicated in the comparative figures (**Figure 4**, **Figure 5**, **Figure 6** and **Figure 7**). The average rate of mine water rise in the period 2016 and 2019 was 4 m/year, this was also observed via the routine water level monitoring that has been ongoing in the period between the downhole surveys.

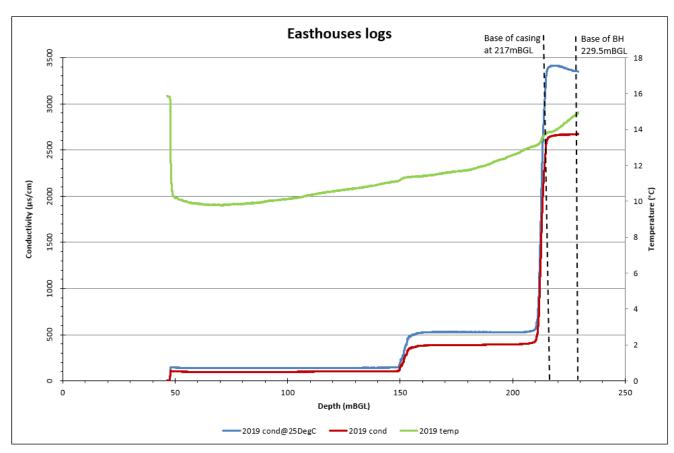


Figure 1: Graph showing all data for the 2019 survey. Including; conductivity, temperature and natural gamma

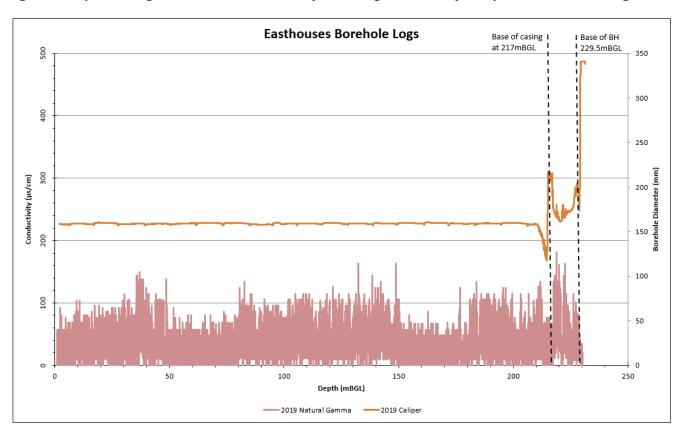


Figure 2: Natural gamma results against the calliper data for the 2019 survey

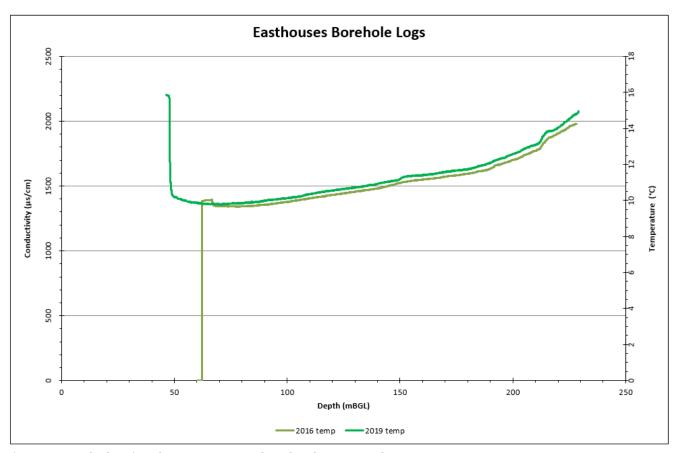


Figure 3: Graph showing the temperature data for the 2016 and 2019 surveys

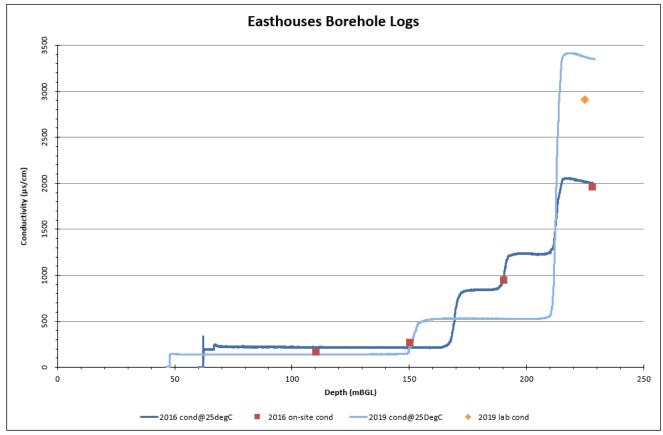


Figure 4: Graph showing the conductivity for the 2016 and 2019 surveys

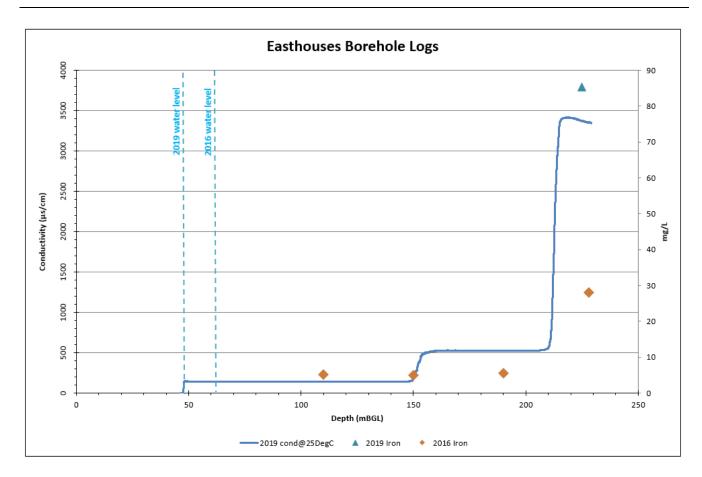


Figure 5: Graph showing the iron data from the 2016 and 2019 surveys

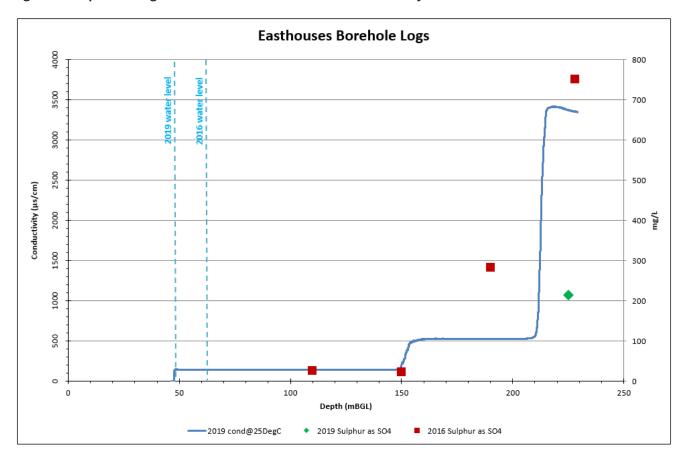


Figure 6: Graph showing the sulphur data from the 2016 and 2019 surveys

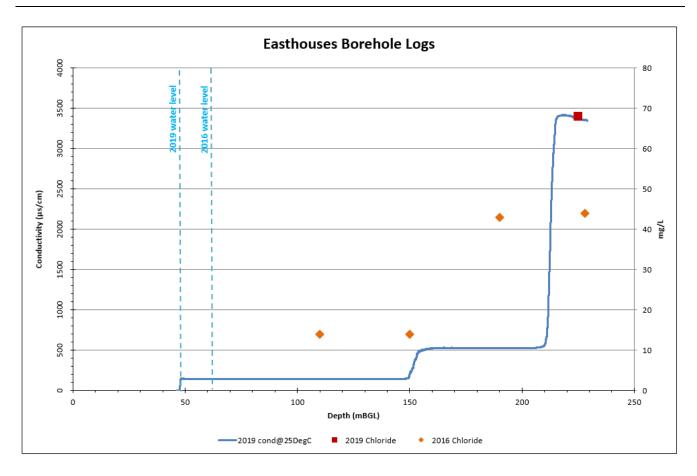


Figure 7: Graph showing the chloride data from the 2016 and 2019 surveys

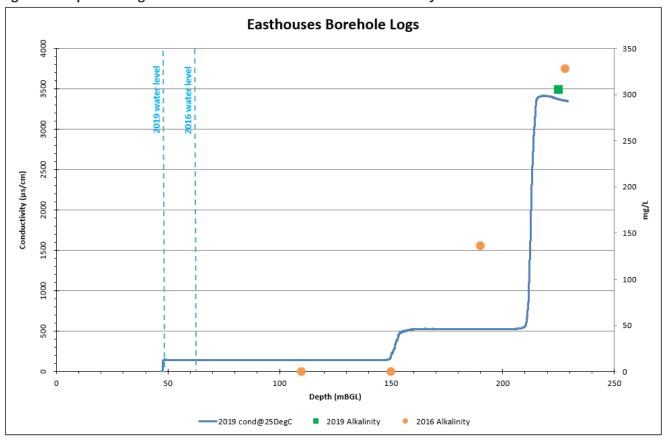


Figure 8: Graph showing the alkalinity data from 2016 and 2019



Plate 1: Water level at 47.6 mBGL.



Plate 2: Level of the first step change in the borehole with a casing joint at 149mBGL



Plate 3: Scratches from a previous calliper survey and debris at 207mBGL

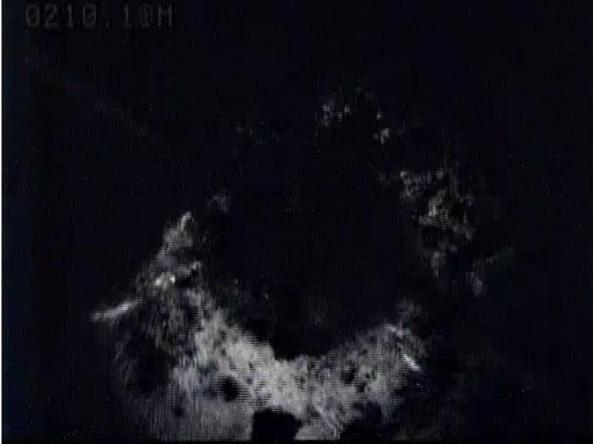


Plate 4: Level of the second step change and increase in debris in the borehole at 210mBGL



Plate 5: Build-up of debris in borehole at 212mBGL. CCTV survey ended at 214.27mBGL due to poor image



RUN BOREHOLE RECORD  NO. BIT FROM TO SIZE WGT. FROM TO	DATE11/07/19TYPE FLUID IN HOLEWaterRUN NoSALINITYSALINITYTYPE LOGCompositeDENSITY47.8DEPTH-DRILLER231.2MAX. REC. TEMP.BTM LOGGED INTERVAL231.2MAX. REC. TEMP.TOP LOGGED INTERVAL1CASING SHOEOPERATING RIG TIMEJBRECORDED BYJBWITNESSED BYKO	RMANENT DATUM GL ELEVATION  G MEAS. FROM  ABOVE PERM. DATUM  SILLING MEAS. FROM	COMPANY Coal Authority  WELL ID Easthouses  FIELD  COUNTRY Scotland STATE  LOCATION  Latitude: 55.882426  Longitude: -3.0535163  COMPANY Coal Authority  Easthouses  OTHER SERVICES	ROBERTSON GEO SERVICES Unlocking Your GeoData
Depth Natural Gam		Temperature  DegC 20	Conductivity @25DegC	Absolute Conductivity
1m:200m 0 API	200 0 MM 400 0	DegC 20		0 uS/cm 4000
10.0				
15.0				
20.0				
30.0				
35.0				
40.0				
45.0				
50.0				
55.0				
70.0				
75.0				
80.0				
85.0				
90.0				
100.0				
105.0				
110.0				
115.0				
120.0				
125.0				
135.0				
140.0				
145.0				
150.0				
155.0				
160.0				
170.0				
175.0				
180.0				
185.0				
190.0				
195.0				
200.0				
210.0				
215.0				
220.0				
225.0				
230.0				

# **Certificate of Conformity**



This is to certify that the following equipment conforms to the specification detailed below

**Equipment type:** Temperature Conductivity Probe

RG Order No: ORD00000

Serial No: TCDS 2822

**Comm. Type:** Standard 4-Core

**Quality Management System:** 

ISO 9001:2015

Certified by TÜV SÜD

**Tested by:** T Hamflett

**Date:** 14/03/19

Approved by:

Tim Hamflett | Test Engineer

**Date:** 14/03/19



### **Robertson Geologging Ltd.**

Deganwy, Conwy, LL31 9PX, United Kingdom T: +44 (0) 1492 582 323 E: support@robertson-geo.com

www.robertson-geo.com



The probe detailed has been calibrated and then logged in the **ROBERTSON GEO** Test Borehole (Deganwy, UK). The resulting data falls within acceptable tolerances and meets all test criteria.



Down Pass: 0-50m Up Pass: 50-0m

	0.00		uS/cm	1000.00	0.00	NGAM API	300.00
	0.00	CON2	uS/cm	1000.00	0.00	NGA2 API	300.00
2.00							
4.00			1		3		
6.00							
8.00					1		
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18.00					*		
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Channel	<b>X</b> <sup>n</sup>	Coefficient
	0	-8.81863
1	1	4.81721E-3
TEMP	2	0.0
	3	0.0
	0	4.33278
2	1	0.958435
COND	2	3.76568E-7
	3	7.06512E-11
	0	0.0
3	1	1.29518
NGAM	2	0.0
	3	0.0
	0	0.0
4	1	1.0
	2	0.0
	3	0.0
	0	0.0
5	1	1.0
	2	0.0
	3	0.0
	0	0.0
6	1	1.0
	2	0.0
	3	0.0
	0	0.0
7	1	1.0
	2	0.0
	3	0.0
	0	0.0
8	1	1.0
	2	0.0
	3	0.0
	0	0.0
9	1	1.0
	2	0.0
	3	0.0
	0	0.0
10	1	1.0
	2	0.0
	3	0.0
	0	0.0
11	1	1.0
	2	0.0
	3	0.0
	0	0.0
12	1	1.0
	2	0.0
	3	0.0

Calibrated Value= $ax^0+bx^1+cx^2+dx^3$ 



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Deganwy, Conwy, LL31 9PX,
United Kingdom
T: +44 (0) 1492 582 323
E: growlands@robertson-geo.com
www.robertson-geo.com



# **Certificate of Conformity**



This is to certify that the following equipment conforms to the specification detailed below

**Equipment type:** 3-Arm Caliper Probe (710mm range)

RG Order No: ORD03163

Serial No: 3ACS 11132

**Comm. Type:** Standard 4-Core

**Quality Management System:** 

ISO 9001:2015

Certified by TÜV SÜD

**Tested by:** T Hamflett

**Date:** 21/01/19

Approved by:

Tim Hamflett | Test Engineer

**Date:** 21/01/19



Deganwy, Conwy, LL31 9PX, United Kingdom T: +44 (0) 1492 582 323 E: support@robertson-geo.com

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The probe detailed has been calibrated and then logged in the **ROBERTSON GEO** Test Borehole (Deganwy, UK). The resulting data falls within acceptable tolerances and meets all test criteria.



Main Pass: 70-25m Repeat Pass: 70-55m

0.00	NGAM CPS	300.00	0.0	CALP mm	300.00
	NGA2 CPS		_	CAL2 mm	
0.00		300.00	0.0	00	300.00
	3				
	3		26.00		
	2		28.00		
×	<b>\[ \]</b>				
	<b>}</b>		30.00		
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			58.00		
			60.00		
			-		
			62.00		
			==		
			64.00	<del>                                      </del>	
			66.00		
			68.00		

1	Channel	Х <sup>n</sup>	Coefficient
1		0	
NGAM 2 0.0 3 0.0 3 0.0 -496.237 1 0.0767045 2 -1.23290E-6 3 0.0 3 0.0 3 0.0 3 1.0 2 0.0 3 0.0 4 1.0 2 0.0 3 0.0 4 1.0 2 0.0 3 0.0 5 1 1.0 2 0.0 3 0.0 5 1 1.0 2 0.0 3 0.0 6 1 1.0 2 0.0 3 0.0 6 1 1.0 2 0.0 3 0.0 7 1 1.0 2 0.0 3 0.0 7 1 1.0 2 0.0 3 0.0 9 1 1.0 2 0.0 3 0.0 9 1 1.0 2 0.0 3 0.0 10 0.0 11 1.0 2 0.0 3 0.0 11 1.0 2 0.0 3 0.0 11 1.0 2 0.0 3 0.0 11 1.0 2 0.0 3 0.0 11 1.0 2 0.0 3 0.0 11 1.0 2 0.0 3 0.0 11 1.0 2 0.0 3 0.0 11 1.0 2 0.0 3 0.0 11 1.0 2 0.0 3 0.0	1	_	
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3     1     1.0       2     0.0       3     0.0       0     0.0       1     1.0       2     0.0       3     0.0       0     0.0       1     1.0       2     0.0       3     0.0       0     0.0       1     1.0       2     0.0       3     0.0       0     0.0       1     1.0       2     0.0       3     0.0       9     1     1.0       2     0.0       3     0.0       9     1     1.0       2     0.0       3     0.0       10     1.0       2     0.0       3     0.0       11     1.0       2     0.0       3     0.0       11     1.0       2     0.0       3     0.0			
2	2		
3 0.0 0 0.0 1 1.0 2 0.0 3 0.0 5 1 1.0 2 0.0 3 0.0 5 1 1.0 2 0.0 3 0.0 6 1 1.0 2 0.0 3 0.0 7 1 1.0 2 0.0 3 0.0 7 1 1.0 2 0.0 3 0.0 8 1 1.0 2 0.0 3 0.0 9 1 1.0 2 0.0 3 0.0 9 1 1.0 2 0.0 3 0.0 10 1.0 2 0.0 11 1.0 2 0.0 11 1.0 2 0.0 3 0.0 11 1.0 2 0.0 3 0.0 11 1.0 2 0.0 3 0.0 11 1.0 2 0.0 3 0.0 11 1.0 2 0.0 3 0.0	,		
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4			
2     0.0       3     0.0       0     0.0       1     1.0       2     0.0       3     0.0       0     0.0       1     1.0       2     0.0       3     0.0       0     0.0       1     1.0       2     0.0       3     0.0       0     0.0       1     1.0       2     0.0       3     0.0       9     1     1.0       2     0.0       3     0.0       10     1     1.0       2     0.0       3     0.0       11     1.0       2     0.0       3     0.0       0     0.0       11     1.0       2     0.0       3     0.0	4		
3     0.0       5     1     1.0       2     0.0       3     0.0       0     0.0       1     1.0       2     0.0       3     0.0       0     0.0       1     1.0       2     0.0       3     0.0       0     0.0       1     1.0       2     0.0       3     0.0       9     1     1.0       2     0.0       3     0.0       0     0.0       10     1     1.0       2     0.0       3     0.0       0     0.0       11     1.0       2     0.0       3     0.0       0     0.0       11     1.0       2     0.0       3     0.0	•		
5   0   0.0   1   1.0   2   0.0   3   0.0   0   0.0   1   1.0   2   0.0   3   0.0   0   0   0.0   1   1.0   2   0.0   3   0.0   0   0   0.0   1   1.0   2   0.0   3   0.0   0   0   0.0   1   1.0   2   0.0   3   0.0   0   0   0.0   1   1.0   2   0.0   3   0.0   0   1   1.0   2   0.0   3   0.0   0   1   1.0   2   0.0   3   0.0   0   1   1.0   2   0.0   3   0.0   0   1   1.0   2   0.0   3   0.0   0   1   1.0   2   0.0   3   0.0   0   1   1.0   2   0.0   3   0.0   0   0.0   1   1   1.0   2   0.0   3   0.0   0   0.0   1   1   1.0   2   0.0   3   0.0   0   0.0   1   1   1.0   2   0.0   3   0.0   0   0.0   1   1   1.0   2   0.0   3   0.0   0   0.0   1   1   1.0   2   0.0   3   0.0   0   0.0   0   0.0   0   0.0   0		_	
5     1     1.0       2     0.0       3     0.0       0     0.0       1     1.0       2     0.0       3     0.0       0     0.0       1     1.0       2     0.0       3     0.0       0     0.0       1     1.0       2     0.0       3     0.0       9     1     1.0       2     0.0       3     0.0       0     0.0       10     1     1.0       2     0.0       3     0.0       0     0.0       11     1.0       2     0.0       3     0.0		_	
2     0.0       3     0.0       0     0.0       1     1.0       2     0.0       3     0.0       0     0.0       1     1.0       2     0.0       3     0.0       0     0.0       1     1.0       2     0.0       3     0.0       9     1     1.0       2     0.0       3     0.0       0     0.0       10     1     1.0       2     0.0       3     0.0       0     0.0       11     1.0       2     0.0       3     0.0	F		
3     0.0       0     0.0       1     1.0       2     0.0       3     0.0       0     0.0       1     1.0       2     0.0       3     0.0       0     0.0       1     1.0       2     0.0       3     0.0       9     1     1.0       2     0.0       3     0.0       0     0.0       1     1.0       2     0.0       3     0.0       0     0.0       11     1.0       2     0.0       3     0.0	5		
6			
6 1 1.0 2 0.0 3 0.0 7 1 1.0 2 0.0 3 0.0 7 1 1.0 2 0.0 3 0.0 8 1 1.0 2 0.0 3 0.0 9 1 1.0 2 0.0 3 0.0 9 1 1.0 2 0.0 3 0.0 1 1.0 2 0.0 3 0.0 1 1.0 2 0.0 3 0.0 1 1.0 2 0.0 3 0.0 1 1.0 2 0.0 3 0.0 1 1.0 2 0.0 3 0.0 1 1.0 2 0.0 3 0.0 0 0.0 1 1.0 2 0.0 3 0.0 0 0.0 1 1.0 2 0.0 3 0.0 0 0.0 1 1.0 2 0.0 3 0.0		_	
2     0.0       3     0.0       0     0.0       1     1.0       2     0.0       3     0.0       0     0.0       1     1.0       2     0.0       3     0.0       0     0.0       1     1.0       2     0.0       3     0.0       0     0.0       1     1.0       2     0.0       3     0.0       0     0.0       11     1.0       2     0.0       3     0.0	_		
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7			
7		_	
2     0.0       3     0.0       0     0.0       1     1.0       2     0.0       3     0.0       0     0.0       1     1.0       2     0.0       3     0.0       0     0.0       1     1.0       2     0.0       3     0.0       0     0.0       11     1.0       2     0.0       3     0.0			
3     0.0       0     0.0       1     1.0       2     0.0       3     0.0       0     0.0       1     1.0       2     0.0       3     0.0       0     0.0       1     1.0       2     0.0       3     0.0       0     0.0       11     1.0       2     0.0       3     0.0	7		
8			
8			
9 1 1.0 2 0.0 3 0.0 1 1.0 2 0.0 3 0.0 3 0.0 0 0.0 1 1.0 2 0.0 3 0.0 1 1.0 2 0.0 3 0.0 1 1.0 2 0.0 3 0.0 1 1.0 2 0.0 3 0.0 0 0.0 1 1.0 2 0.0 3 0.0			
9 1 1.0 2 0.0 3 0.0 2 0.0 3 0.0 0 0.0 1 1.0 2 0.0 3 0.0 1 1.0 2 0.0 3 0.0 1 1.0 2 0.0 3 0.0 0 0.0	8		
9			
9 1 1.0 2 0.0 3 0.0 0 0.0 1 1.0 2 0.0 3 0.0 0 0.0 1 1.0 2 0.0 1 1.0 2 0.0 3 0.0 0 0.0 1 1.0 2 0.0 3 0.0		_	
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10			
10		3	
2 0.0 3 0.0 0 0.0 1 1.0 2 0.0 3 0.0		0	
11 2 0.0 11 1 1.0 2 0.0 3 0.0	10	1	1.0
11			0.0
11 1.0 2 0.0 3 0.0		3	
2 0.0 3 0.0		0	0.0
3 0.0	11	1	1.0
		2	0.0
		3	
		0	
12 1 1.0	12	1	
2 0.0		2	
3 0.0			

Calibrated Value= $ax^0+bx^1+cx^2+dx^3$ 



### **Robertson Geologging Ltd.**

Deganwy, Conwy, LL31 9PX, United Kingdom

T: +44 (0) 1492 582 323
E: growlands@robertson-geo.com
www.robertson-geo.com



# Appendix B – Laboratory Certificate of Analysis

CA08/20/1/901/5

20190712 Easthouses CCTV.zip (metadata)

Our Ref: EXR/287271 (Ver. 1)

Your Ref:

July 22, 2019

John Leyland Coal Authority 200 Lichfield Lane Berry Hill Mansfield Nottinghamshire NG18 4RG



Environmental Chemistry SOCOTEC UK Limited Bretby Business Park Ashby Road Burton-on-Trent Staffordshire

Telephone: 01283 554400 Facsimile: 01283 554422

DE15 0YZ

For the attention of John Leyland

Dear John Leyland

# Sample Analysis - Bilston Glen

Samples from the above site have been analysed in accordance with the schedule supplied. The sample details and the results of analyses for these samples are given in the appended report.

An invoice for this work will follow under a separate cover.

Please be aware that our policy for the retention of paper based laboratory records and analysis reports is 6 years.

The work was carried out in accordance with SOCOTEC UK Limited (Multi-Sector Services) Standard Terms and Conditions of Contract.

If I can be of any further assistance please do not hesitate to contact me.

Yours sincerely

for SOCOTEC UK Limited

E Jones

Project Co-ordinator 01283 554400

# **TEST REPORT**

Report No. EXR/287271 (Ver. 1)

Coal Authority 200 Lichfield Lane Berry Hill Mansfield Nottinghamshire NG18 4RG

# Site: Bilston Glen

The 5 samples described in this report were registered for analysis by SOCOTEC UK Limited on 13-Jul-2019. This report supersedes any versions previously issued by the laboratory.

The analysis was completed by: 22-Jul-2019

The following tables are contained in this report:

Table 1 Main Analysis Results (Pages 2 to 4)
Analytical and Deviating Sample Overview (Pages 5 to 6)
Table of Method Descriptions (Page 7)
Table of Report Notes (Page 8)
Table of Sample Descriptions (Appendix A Page 1 of 1)

On behalf of SOCOTEC UK Lim Becky Batham Oper

Operations Manager Energy & Waste Services

Tests marked '^' have been subcontracted to another laboratory.

Where samples have been flagged as deviant on the Analytical and Deviating Sample Overview, for any reason, the data may not be representative of the sample at the point of sampling and the validity of the data may be affected. SOCOTEC UK Limited accepts no responsibility for any sampling not carried out by our personnel.

Date of Issue: 22-Jul-2019

		Units :					mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l					
		Method Codes : porting Limits :	0.001	0.002	0.002	0.01	0.01	0.01	1	0.01	0.01	0.01	1	ICPWATVAR 1	0.1	ICPWATVAR 1	0.01	ICPWATVAR 3
LAB ID Number EX/	Client Sample Description	Sample Date	Nickel as Ni (Dissolved)	Zinc as Zn (Dissolved)	Manganese as Mn (Total)	Barium as Ba (Dissolved) a	Boron as B (Dissolved) a	Cadmium as CD (Dissolved) a	Calcium as Ca (Dissolved) a	Copper as Cu (Dissolved) a	Iron as Fe (Dissolved) a	Lead as Pb (Dissolved) a	Magnesium as Mg (Dissolved) a	Potassium as K (Dissolved) a	Silicon as Si (Dissolved) a	Sodium as Na (Dissolved) a	Strontium as Sr (Dissolved) a	Total Sulphur as SO4 (Dissolved) a
1988836	No.1 DC Shaft 220	10-Jul-19 16:46	0.002	0.007	0.373	0.88	0.18	<0.01	120	<0.01	0.87	<0.01	71	18	4.8	147	2.28	81
1988837	No.1 DC Shaft 350	10-Jul-19	0.003	0.016	0.352	0.95	0.18	<0.01	117	<0.01	0.87	<0.01	70	19	4.7	147	2.28	76
1988838	No.1 DC Shaft 480	10-Jul-19 17:40	0.005	0.016	0.334	1.07	0.18	<0.01	116	<0.01	0.91	<0.01	72	19	4.8	150	2.35	70
1988839	No.1 DC Shaft 610	10-Jul-19 18:35	0.008	0.019	0.308	1.22	0.18	<0.01	114	<0.01	0.91	<0.01	72	19	4.8	154	2.39	65
1988840	Great Seam BH 225	11-Jul-19 10:50	0.09	0.469	7.177	0.04	0.73	<0.01	388	<0.01	66.3	<0.01	324	33	8.2	44	2.85	214
	Bretby Business Park, Ashby Road Burton-on-Trent, Staffordshire, DE15 0YZ Tel +44 (0) 1283 554400 Fax+44 (0) 1283 554422	I	Client N Contact		Coal At	and	ston G	Blen				Date Prin Report N Table Nu	ited umber	ple Ana	22	2-Jul-2019 KR/287271		

				mg/l	mg/l mg/l mg/l mg/l mg/l mg/l %					meq	meq	mg/l	mg/l	mg/l	mg/l	mg/l		
		Method Codes : porting Limits :	0.01	0.01	KONEFE 0.01	KONEFE 0.01	KONENS 0.01	KONENS 1	KONENS 0.2	KONENS 0.01	WCALC1 0.1	WCALC1 0.1	WCALC1 0.1	WSLM10 5	WSLM12	WSLM13 0.2	WSLM13 0.2	WSLM17 2
	method No	porting Ellinto .	0.01	0.01	0.01	0.01	0.01		0.2	0.01	0.1	0.1	0.1	Ü		0.2	0.2	_
LABID Number EX/	Client Sample Description	Sample Date	Aluminium as Al (Total) a	Iron as Fe (Total) a	Ferrous Iron as Fe(2+)	Iron as Fe:(Total)	Ammoniacal Nitrogen as N	Chloride as Cl w	Nitrate as N	Phosphate as P	lonic Balance % c	Total Anions meq c	Total Cations meq c	Suspended Solids w	Total Alkalinity as CaCO3 w	Dissolved Organic Carbon w	Total Organic Carbon w	Cold Acidity as CaCO3 w
1988836	No.1 DC Shaft 220	10-Jul-19 16:46	<0.01	0.33	0.31	0.32	1.0	251	<0.2	0.02	2.0	18.1	18.9	<5	467	1.0	0.96	Nil
1988837	No.1 DC Shaft 350	10-Jul-19	0.01	0.39	0.37	0.37	1.0	254	<0.2	<0.01	1.3	18.2	18.6	<5	472	0.99	0.97	Nil
1988838	No.1 DC Shaft 480	10-Jul-19 17:40	<0.01	0.41	0.40	0.43	1.0	256	<0.2	<0.01	2.6	18.0	18.9	<5	464	0.98	0.92	Nil
1988839	No.1 DC Shaft 610	10-Jul-19 18:35	<0.01	0.5	0.52	0.45	1.0	263	<0.2	<0.01	2.5	18.1	19.0	<5	465	0.98	0.93	Nil
1988840	Great Seam BH 225	11-Jul-19 10:50	0.15	85.3	85.3	76.4	1.7	68	0.5	<0.01	60.8	12.5	51.3	175	305	2.0	2.0	92
	Bretby Business Park, Ashby Road Burton-on-Trent, Staffordshire, DE15 0YZ Tel +44 (0) 1283 554400		Client N Contact		Coal Au	and	ston G	Slen				Date Prin Report N Table Nu	nted umber	ple Ana	22	2-Jul-2019 XR/287271 1		

		Units :	mg/l	uS/cm	pH units								
		Method Codes :	WSLM17	WSLM2	WSLM3								
	Method Re	porting Limits :	2	100									
LABID Number EX/	Client Sample Description	Sample Date	Total Acidity as CaCO3 w	Conductivity uS/cm @ 25C w	pH units w								
1988836	No.1 DC Shaft 220	10-Jul-19 16:46	Nil	1660	7.7								
1988837	No.1 DC Shaft 350	10-Jul-19	Nil	1660	7.7								
1988838	No.1 DC Shaft 480	10-Jul-19 17:40	Nil	1670	7.7								
1988839	No.1 DC Shaft 610	10-Jul-19 18:35	Nil	1680	7.7								
1988840	Great Seam BH 225	11-Jul-19 10:50	Nil	2910	6.4								
	SOCOTEC (		Client N	ame	Coal A	uthority				Sam	ple Ana	alysis	
			Contact		John Leyl	and							
	Bretby Business Park, Ashby Road Burton-on-Trent, Staffordshire, DE15 0YZ Tel +44 (0) 1283 554400						ston (	Glen		Date Printed Report Number Table Number		22-Jul-2019 EXR/287271 1	
	Fax +44 (0) 1283 554422												

Report No

# **SOCOTEC UK Ltd Environmental Chemistry Analytical and Deviating Sample Overview**

**Coal Authority** Customer Site **Bilston Glen** W287271

Consignment No W157707 Date Logged 13-Jul-2019 In-House Report Due 22-Jul-2019

Please note the results for any subcontracted analysis (identified with a '^') is likely to take up to an additional five working days.

			MethodID	CUSTSERV	ICPMSW		ICPMSWT	ICPWATVAR													ICPWATVART
ID Number	Description	Matrix Type	Sampled	Report A	Nickel as Ni MS (Dissolved)	Zinc as Zn MS (Dissolved)	Manganese as Mn MS (Total)	Total Sulphur as SO4 (Diss) VAR	Calcium as Ca (Dissolved) VAR	Magnesium as Mg (Dissolved) VAR	Barium as Ba (Dissolved) VAR	Strontium as Sr (Dissolved) VAR	Sodium as Na (Dissolved) VAR	Potassium as K (Dissolved) VAR	Cadmium as Cd (Dissolved) VAR	Copper as Cu (Dissolved) VAR	Lead as Pb (Dissolved) VAR	Iron as Fe (Dissolved) VAR	Boron as B (Dissolved) VAR	Silicon as Si (Dissolved) VAR	Iron as Fe (Total) VAR
					✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓
	No.1 DC Shaft 220	Unclassified	10/07/19																		
EX/1988837	No.1 DC Shaft 350	Unclassified	10/07/19																		
EX/1988838	No.1 DC Shaft 480	Unclassified	10/07/19																		
EX/1988839	No.1 DC Shaft 610	Unclassified	10/07/19																		
EX/1988840	Great Seam BH 225	Unclassified	11/07/19																		

Note: We will endeavour to prioritise samples to complete analysis within holding time; however any delay could result in samples becoming deviant whilst being processed in the laboratory.

If sampling dates are missing or matrices unclassified then results will not be ISO 17025 accredited. Please contact us as soon as possible to provide missing information in order to reinstate accreditation.

#### Deviating Sample Key

- The sample was received in an inappropriate container for this analysis
- B C D E The sample was received without the correct preservation for this analysis
- Headspace present in the sample container
- The sampling date was not supplied so holding time may be compromised applicable to all analysis
- Sample processing did not commence within the appropriate holding time
- Sample processing did not commence within the appropriate handling time

#### Requested Analysis Key

Analysis Required

Analysis dependant upon trigger result - Note: due date may be affected if triggered

No analysis scheduled

Analysis Subcontracted - Note: due date may vary

Report No

EXR/287271 Ver. 1

# **SOCOTEC UK Ltd Environmental Chemistry Analytical and Deviating Sample Overview**

**Coal Authority** Customer Site **Bilston Glen** W287271

Consignment No W157707 Date Logged 13-Jul-2019 In-House Report Due 22-Jul-2019

Please note the results for any subcontracted analysis (identified with a '^') is likely to take up to an additional five working days.

			MethodID	ICPWATVART	KONEFE		KONENS				WCALC1			WSLM10	WSLM12	WSLM13		WSLM17		WSLM2	WSLM3
ID Number	Description	Matrix Type	Sampled	Aluminium as Al (Total) VAR	Ferrous Iron as Fe(2+) KONE	Iron as Fe (Total) KONE	Chloride as Cl (Kone)	Ammoniacal Nitrogen (Kone)	Nitrate as N (Kone calc)	Phosphate as P. (kone)	Ionic Balance %	Total Anions meq	Total Cations meq	Suspended Solids	Total Alkalinity as CaCO3	Total Organic Carbon	Dissolved Organic Carbon	Total Acidity as CaCO3	Cold Acidity as CaCO3	Conductivity uS/cm @ 25C	pH units
				✓	<b>✓</b>	<b>\</b>	<b>\</b>	✓	✓	<b>\</b>				✓	✓	✓		✓	<b>✓</b>	<b>\</b>	✓
	No.1 DC Shaft 220	Unclassified	10/07/19																		
EX/1988837	No.1 DC Shaft 350	Unclassified	10/07/19																		
EX/1988838	No.1 DC Shaft 480	Unclassified	10/07/19																		
EX/1988839	No.1 DC Shaft 610	Unclassified	10/07/19																		
EX/1988840	Great Seam BH 225	Unclassified	11/07/19																		

Note: We will endeavour to prioritise samples to complete analysis within holding time; however any delay could result in samples becoming deviant whilst being processed in the laboratory.

If sampling dates are missing or matrices unclassified then results will not be ISO 17025 accredited. Please contact us as soon as possible to provide missing information in order to reinstate accreditation.

#### Deviating Sample Key

- The sample was received in an inappropriate container for this analysis
- B C D E The sample was received without the correct preservation for this analysis
- Headspace present in the sample container
- The sampling date was not supplied so holding time may be compromised applicable to all analysis
- Sample processing did not commence within the appropriate holding time
- Sample processing did not commence within the appropriate handling time

#### Requested Analysis Key

Analysis Required

Analysis dependant upon trigger result - Note: due date may be affected if triggered

No analysis scheduled

Analysis Subcontracted - Note: due date may vary

Report Number: W/EXR/287271

# **Method Descriptions**

Matrix	MethodID	Analysis	Method Description
		Basis	·
Water	ICPMSW	As Received	Direct quantitative determination of Metals in water samples using ICPMS
Water	ICPMSWT	As Received	Determination of Total Metals in water samples using nitric acid digestion and ICPMS quantitation
Water	ICPWATVAR	As Received	Direct determination of Metals and Sulphate in water samples using ICPOES
Water	ICPWATVART	As Received	Determination of Total Metals in water samples using nitric acid digestion and ICPOES quantitation
Water	KONEFE	As Received	Direct analysis using discrete colorimetric analysis (calculation of Ferric Iron from Total Iron and Ferrous Iron data if required)
Water	KONENS	As Received	Direct analysis using discrete colorimetric analysis
Water	WCALC1	As Received	Calculation based on concentrations of dissolved Cations and anions
Water	WSLM10	As Received	Determination of Suspended Solids in waters by gravimetry
Water	WSLM12	As Received	Titration with Sulphuric Acid to required pH
Water	WSLM13	As Received	Instrumental analysis using acid/persulphate digestion and non- dispersive IR detection
Water	WSLM17	As Received	Titration with Sodium Hydroxide to required pH
Water	WSLM2	As Received	Determination of the Electrical Conductivity (µS/cm) by electrical conductivity probe.
Water	WSLM3	As Received	Determination of the pH of water samples by pH probe

# **Report Notes**

# **Generic Notes**

### Soil/Solid Analysis

Unless stated otherwise,

- Results expressed as mg/kg have been calculated on the basis indicated in the Method Description table.
   All results on MCERTS reports are reported on a 105°C dry weight basis with the exception of pH and conductivity.
- Sulphate analysis not conducted in accordance with BS1377
- Water Soluble Sulphate is on a 2:1 water:soil extract

#### Waters Analysis

Unless stated otherwise results are expressed as mg/l

**Nil**: Where "Nil" has been entered against Total Alkalinity or Total Acidity this indicates that a measurement was not required due to the inherent pH of the sample.

# Oil analysis specific

Unless stated otherwise,

- Results are expressed as mg/kg
- SG is expressed as g/cm<sup>3</sup>@ 15°C

### Gas (Tedlar bag) Analysis

Unless stated otherwise, results are expressed as ug/l

#### **Asbestos Analysis**

CH Denotes Chrysotile
CR Denotes Crocidolite
AM Denotes Amosite
TR Denotes Tremolite
AC Denotes Actinolite
AN Denotes Anthophylite

**NAIIS** No Asbestos Identified in Sample **NADIS** No Asbestos Detected In Sample

# **Symbol Reference**

- ^ Sub-contracted analysis.
- \$\$ Unable to analyse due to the nature of the sample
- ¶ Samples submitted for this analyte were not preserved on site in accordance with laboratory protocols.

This may have resulted in deterioration of the sample(s) during transit to the laboratory.

Consequently the reported data may not represent the concentration of the target analyte present in the sample at the time of sampling

- ¥ Results for guidance only due to possible interference
- & Blank corrected result
- I.S Insufficient sample to complete requested analysis
- I.S(g) Insufficient sample to re-analyse, results for guidance only

Intf Unable to analyse due to interferences

N.D Not determined N.Det Not detected

N.F No Flow

**NS** Information Not Supplied

Req Analysis requested, see attached sheets for results

P Raised detection limit due to nature of the sample

- \* All accreditation has been removed by the laboratory for this result
- **‡** MCERTS accreditation has been removed for this result
- § accreditation has been removed for this result as it is a non-accredited matrix

**Note:** The Laboratory may only claim that data is accredited when all of the requirements of our Quality System have been met. Where these requirements have not been met the laboratory may elect to include the data in its final report and remove the accreditation from individual data items if it believes that the validity of the data has not been affected. If further details are required of the circumstances which have led to the removal of accreditation then please do not hesitate to contact the laboratory.

Page 8 of 8 EXR/287271 Ver. 1

# **Sample Descriptions**

Client : Coal Authority
Site : Bilston Glen
Report Number : W28\_7271

Committee   Comm	Lab ID Number	Client ID	Description
EX/1988837         No.1 DC Shaft 350         Unclassified           EX/1988838         No.1 DC Shaft 480         Unclassified           EX/1988839         No.1 DC Shaft 610         Unclassified			
EX1988839 No 1DC Shaft 400 Unclassified EX1988840 Great Seam BH 225 Unclassified EX1988840 Great Seam BH 226 Unclassifi	EX/1988836	No.1 DC Shaft 220	Unclassified
EXT988839 No.1 DC Shaft 90 Unclassified EXT988840 Great Seam BH 225 Unclassified	EX/1988837	No.1 DC Shaft 350	Unclassified
EN1988840 Great Seam BH 225 Unclassified	EX/1988838	No.1 DC Shaft 480	Undassilieu
	EX/1988840	Great Seam BH 225	Linclassified
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Appendix A Page 1 of 1 22/07/2019EXR/287271 Ver. 1