AMG RESOURCES LIMITED

Permit number EPR/BM2381IQ

2021 Annual Review

Report Number 2232r1v1d0222

Commissioned by
AMG Resources Limited
Nevill's Dock
Llanelli
Carmarthenshire
SA15 2HD

Prepared by
Geotechnology Ltd
Ty Coed
Cefn-yr-Allt
Aberdulais
SA10 8HE

February 2022

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1 INTRODUCTION

Each year, AMG Resources Limited (AMG) is required to undertake a report on the performance of the activities over the previous year and report to Natural Resources Wales by 31 January each year.

Condition 4.2.2. of AMG's Environmental Permit (EPR/BM2381IQ) states:

"A report or reports on the performance of the activities over the previous year shall be submitted to Natural Resources Wales by 31 January (or other date agreed in writing by Natural Resources Wales) each year. The report(s) shall include as a minimum:
(a) a review of the results of the monitoring and assessment carried out in accordance with the permit including an interpretive review of the data."

This report provides a review of the data gathered during 2021 and has been compiled on behalf of AMG by Geotechnology Ltd.

2 PERMIT RETURNS

The Permit provides template forms for capturing data required by NRW. These have been completed by AMG and are provided in Appendix 1.

2.1 Energy Usage

As the Installation Permit is no longer active the site did not consume any energy related to the Installation Permit.

2.2 Raw Material

No raw materials were consumed at the installation in 2021.

2.3 Waste

No waste was removed from the Installation in 2021.

2.4 Air Emissions

There continues to be no emissions to air from emission points A1, A2 and A3 to report due to the boiler being decommissioned on 29 April 2015.

3 GROUNDWATER MONITORING

3.1 Monitoring Network

The monitoring network comprises a series of shallow boreholes that have been monitored for over a decade.

3.2 Monitoring Programme

During 2021, the groundwater wells have been monitored at least 6 monthly. If sufficient water has been found to be present, samples have been collected for testing at UKAS accredited ALS based in Chester. The original laboratory certificates are provided in Appendix 2.

G1 – sampled in May and December 2021.
G2 – not possible to collect samples during 2021 due to insufficient groundwater.
G3 - Geotechnology understands that sampling from this position is no longer required.
G4 – not possible to sample in 2021 due to below ground blockage.
G5 - sampled in March, May and December 2021.
G6 – sampled in March 2021 but insufficient water present on other occasions.

At all of the wells, there is often very little groundwater present making collection of representative samples difficult. To address this issue and further inform the ongoing surrender application preparation new boreholes were installed in January 2022. These are soon to be sampled.

3.3 Groundwater Levels

Groundwater is typically 2-4m below ground level and typically varies by less than 1m between seasons and years. This data is presented in Appendix 3. Groundwater has been typically highest at positions G4, G5 and G7.

3.4 Groundwater Quality

Temporal variation of selected parameters is presented in Appendix 3. The analysis reveals long-term improvements in groundwater quality, particularly in terms of several trace metals.

The groundwater at G5 and G2 is characterised by a strongly alkaline pH (pH 9.5 – 10.5) whilst the other wells contain groundwater with pH between approximately pH 7 and 8. The more alkaline groundwater tends to be more mineralised.

In recent years, most trace metals have been present at declining and low concentrations. Tin continues to be detectable at several positions and during 2020 and 2021 Arsenic, Chromium, Iron, Lead, Mercury, Nickel and Zinc were detected. The levels observed are similar to levels observed previously with some concentrations above Environmental Quality Standards. The highest concentrations tend to be found at G5 and G7.

Hydrocarbons were also found at G6, as noted previously.

4 CONCLUSIONS

The AMG site at Llanelli is currently not used for the activities detailed in the Installation Permit. This is reflected in the annual returns. During 2022, AMG intends to surrender the Permit and focus resources on the existing Standard Rules Permit. An initial appraisal of the groundwater data suggests that groundwater quality has not deteriorated from that detected at the time of Permit issue but this aspect will be reviewed in more detail as part of the surrender application.

AMG RESOURCES LIMITED

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Appendix 1
NRW Returns

Report Number 2232r1v1d0222

Permit Number: BM3381IQ Operator: AMG Resources Ltd

Facility: AMG Resources Ltd Form Number: Air1 / 13/06/20

Reporting of emissions to air for the period from 01/01/2021 to 31/12/2021

Emission Point	Substance / Parameter	Emission Limit Value	Reference Period	Result [1]	Test Method [2]	Sample Date and Times [3]	Uncertainty [4]
A2	Particulate Matter	5 mg/m³	Continuous	n/a	BS EN 13284-1		
	Copper, lead, zinc and their compounds taken together (as metal)	2.0 mg/m³		n/a	BS EN 13284-1		
	Cadmium, arsenic, nickel and their compounds taken together (as elements	0.2 mg/m³		n/a	-		
	Tin and its compounds (as Sn)	2.0 mg/m³		n/a	-		
	Dioxins (ITEQ)	0.1 ng/m³		n/a	-		
A3	Particulate matter	5 mg/m³	Continuous	n/a	BS EN 13284-1		
A3	Oxides of Nitrogen	200 mg/m³		n/a	-		

[1] The result given is the maximum value (or the minimum value in the case of a limit that is expressed as a minimum) obtained during the reporting period, expressed in the same terms as the emission limit value. Where the emission limit value is expressed as a range, the result is given as the 'minimum – maximum' measured values.
[2] Where an internationally recognised standard test method is used the reference number is given. Where another method that has been formally agreed with Natural Resources Wales is used, then the appropriate identifier is given. In other cases the principal technique is stated, for example gas chromatography.
[3] For non-continuous measurements the date and time of the sample that produced the result is given. For continuous measurements the percentage of the process operating time covered by the result is given.
[4] The uncertainty associated with the quoted result at the 95% confidence interval, unless otherwise stated.

Signed ..... Date 16.02.22

(Authorised to sign as representative of Operator)

Permit Number: BM3381IQ Operator: AMG Resources Limited

Facility: AMG Resources Ltd Form Number: Water1 / 13/06/20

Reporting of emissions to water (other than to sewer) and land for the period from 01/01/2021 **to** 31/12/2021

Emission Point	Substance / Parameter	Emission Limit Value	Reference Period	Result [1]	Test Method [2]	Sample Date and Times [3]	Uncertainty [4]
W1	Total Oxidised Nitrogen (TON) as N mg l-1	3 mg/l		n/a			

[1] The result given is the maximum value (or the minimum value in the case of a limit that is expressed as a minimum) obtained during the reporting period, expressed in the same terms as the emission limit value. Where the emission limit value is expressed as a range, the result is given as the 'minimum – maximum' measured values.

[2] Where an internationally recognised standard test method is used the reference number is given. Where another method that has been formally agreed with Natural Resources Wales is used, then the appropriate identifier is given. In other cases the principal technique is stated, for example gas chromatography.

[3] For non-continuous measurements the date and time of the sample that produced the result is given. For continuous measurements the percentage of the process operating time covered by the result is given.

[4] The uncertainty associated with the quoted result at the 95% confidence interval, unless otherwise stated.

Signed ..... Date 16.02.22

(Authorised to sign as representative of Operator)

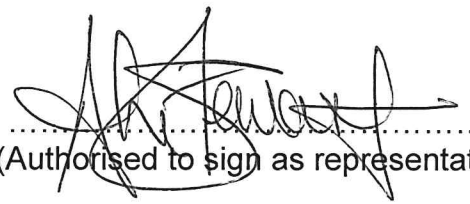
Permit Number:	BM3381IQ	Operator:	AMG Resources Ltd]
Facility:	AMG Resources Ltd	Form Number:	Energy1 / 13/06/20

Reporting of Energy Usage for the year 2021

Energy Source	Energy Usage Quantity	Primary Energy (MWh)	Specific Usage (MWh/unit output)
Electricity *	MWh	N/A	
Natural Gas	MWh	N/A	
Gas Oil	tonnes	N/A	
Recovered Fuel Oil	tonnes	N/A .	
TOTAL	-	N/A .	

* Conversion factor for delivered electricity to primary energy = 2.4

Operator's comments : NIL RETURN

Signed  .....

(Authorised to sign as representative of Operator)

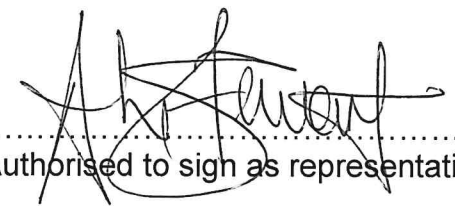
Date 16.02.22

Permit Number:	BM3381IQ	Operator:	AMG Resources Ltd
Facility:	AMG Resources Ltd	Form Number:	Performance1 / 13/06/20

Reporting of other performance indicators for the period 01/01/2021 to 31/12/2021

Parameter	Units
Total raw material used N/A.	tonnes N/A -

Operator's comments : NIL RETURN.

Signed  .....

(Authorised to sign as representative of Operator)

Date 16.02.22

AMG RESOURCES LIMITED

Permit number EPR/BM2381IQ

2021 Annual Review

Appendix 2 Groundwater Monitoring Certificates

Report Number 2232r1v1d0222

Unit 7-8 Hawarden Business Park
Manor Road (off Manor Lane)
Hawarden
Deeside
CH5 3US
Tel: (01244) 528700
Fax: (01244) 528701
email: hawardencustomerservices@alsglobal.com
Website: www.alsenvironmental.co.uk

Geotechnology
5 Cefn-yr-Allt
Aberdulais
Neath
West Glamorgan
SA10 8HE

Attention: Ben Rees

CERTIFICATE OF ANALYSIS

Date of report Generation:	07 April 2021
Customer:	Geotechnology
Sample Delivery Group (SDG):	210326-48
Your Reference:	
Location:	AMG Llanelli
Report No:	593080

We received 2 samples on Friday March 26, 2021 and 2 of these samples were scheduled for analysis which was completed on Wednesday April 07, 2021. Accredited laboratory tests are defined within the report, but opinions, interpretations and on-site data expressed herein are outside the scope of ISO 17025 accreditation.

Should this report require incorporation into client reports, it must be used in its entirety and not simply with the data sections alone.

Chemical testing (unless subcontracted) performed at ALS Life Sciences Ltd Hawarden (Method codes TM) or ALS Life Sciences Ltd Aberdeen (Method codes S).

All sample data is provided by the customer. The reported results relate to the sample supplied, and on the basis that this data is correct.
Incorrect sampling dates and/or sample information will affect the validity of results.
The customer is not permitted to reproduce this report except in full without the approval of the laboratory.

Approved By:

Sonia McWhan

Operations Manager

CERTIFICATE OF ANALYSIS

SDG:	210326-48	**Client Reference:**		**Report Number:**	593080
Location:	AMG Llanelli	**Order Number:**		**Superseded Report:**	

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
23974984	BH1			25/03/2021
23974985	BH5			25/03/2021

Only received samples which have had analysis scheduled will be shown on the following pages.

Validated

CERTIFICATE OF ANALYSIS

SDG:	210326-48	**Client Reference:**		**Report Number:**	593080
Location:	AMG Llanelli	**Order Number:**		**Superseded Report:**	

Results Legend

X Test

N No Determination Possible

Sample Types -

S - Soil/Solid
UNS - Unspecified Solid
GW - Ground Water
SW - Surface Water
LE - Land Leachate
PL - Prepared Leachate
PR - Process Water
SA - Saline Water
TE - Trade Effluent
TS - Treated Sewage
US - Untreated Sewage
RE - Recreational Water
DW - Drinking Water Non-regulatory
UNL - Unspecified Liquid
SL - Sludge
G - Gas
OTH - Other

Lab Sample No(s)												23974984	23974985
Customer Sample Reference												BH1	BH5
AGS Reference													
Depth (m)													
Container												0.5l glass bottle (ALE227)	500ml Plastic (ALE208)	H2SO4 (ALE244)	HNO3 Filtered (ALE204)	NaOH (ALE245)	Vial (ALE297)	0.5l glass bottle (ALE227)	500ml Plastic (ALE208)	H2SO4 (ALE244)	NaOH (ALE245)	Vial (ALE297)
Sample Type												GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW
Ammoniacal Nitrogen	All	NDPs: 0 Tests: 2												X						X		
Anions by Kone (w)	All	NDPs: 0 Tests: 2											X						X			
Conductivity (at 20 deg.C)	All	NDPs: 0 Tests: 2											X						X			
Dissolved Metals by ICP-MS	All	NDPs: 0 Tests: 2													X				X			
EPH (DRO) (C10-C40) Aqueous (W)	All	NDPs: 0 Tests: 2										X						X				
GRO by GC-FID (W)	All	NDPs: 0 Tests: 2															X					X
Mercury Dissolved	All	NDPs: 0 Tests: 2													X				X			
Nitrite by Kone (w)	All	NDPs: 0 Tests: 2														X					X	
pH Value	All	NDPs: 0 Tests: 2											X						X			
Suspended Solids	All	NDPs: 0 Tests: 2											X						X			
Total EPH (aq)	All	NDPs: 0 Tests: 2										X						X				
TPH by IR Oils and Greases	All	NDPs: 0 Tests: 2										X						X				

Validated

CERTIFICATE OF ANALYSIS

SDG:	210326-48	**Client Reference:**		**Report Number:**	593080
Location:	AMG Llanelli	**Order Number:**		**Superseded Report:**	

Results Legend

#	ISO17025 accredited.
M	mCERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted - refer to subcontractor report for accreditation status.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-4+$@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	BH1	BH5				
			Depth (m)	.	.				
			Sample Type	Ground Water (GW)	Ground Water (GW)				
			Date Sampled	25/03/2021	25/03/2021				
			Sample Time	07:40:00	08:10:00				
			Date Received	26/03/2021	26/03/2021				
			SDG Ref	210326-48	210326-48				
			Lab Sample No.(s)	23974984	23974985				
			AGS Reference						
Suspended solids, Total	<2 mg/l	TM022		108 #	1190 #				
Ammoniacal Nitrogen as N	<0.2 mg/l	TM099		<0.2 #	14.5 #				
Conductivity @ 20 deg.C	<0.02 mS/cm	TM120		0.878 #	15.1 #				
Arsenic (diss.filt)	<0.5 µg/l	TM152		35.7 #	1600 2 #				
Cadmium (diss.filt)	<0.08 µg/l	TM152		<0.08 #	<0.8 2 #				
Chromium (diss.filt)	<1 µg/l	TM152		<1 #	<10 2 #				
Copper (diss.filt)	<0.3 µg/l	TM152		3.56 #	39 2 #				
Lead (diss.filt)	<0.2 µg/l	TM152		<0.2 #	4.1 2 #				
Nickel (diss.filt)	<0.4 µg/l	TM152		1.71 #	54.5 2 #				
Selenium (diss.filt)	<1 µg/l	TM152		1.74 #	<10 2 #				
Zinc (diss.filt)	<1 µg/l	TM152		4.65 #	13.7 2 #				
EPH Range >C10 - C40 (aq)	<100 µg/l	TM172		276 #	998 #				
Total EPH (C6-C40) (aq)	<100 µg/l	TM172		276	998				
Mercury (diss.filt)	<0.01 µg/l	TM183		<0.01 #	0.071 2 #				
Nitrite as NO2	<0.05 mg/l	TM184		<0.05 #	0.082 #				
Chloride	<2 mg/l	TM184		22.9 #	250 #				
Total Oxidised Nitrogen as N	<0.1 mg/l	TM184		0.673 #	<0.1 #				
TPH / Oil & Greases	<1 mg/l	TM235		<1	22				
pH	<1 pH Units	TM256		8.27 #	9.77 #				

Validated

CERTIFICATE OF ANALYSIS

SDG:	210326-48	**Client Reference:**		**Report Number:**	593080
Location:	AMG Llanelli	**Order Number:**		**Superseded Report:**	

GRO by GC-FID (W)

Results Legend	
#	ISO17025 accredited.
M	mCERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted - refer to subcontractor report for accreditation status.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-4+$@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	BH1	BH5				
			Depth (m)	.	.				
			Sample Type	Ground Water (GW)	Ground Water (GW)				
			Date Sampled	25/03/2021	25/03/2021				
			Sample Time	07:40:00	08:10:00				
			Date Received	26/03/2021	26/03/2021				
			SDG Ref	210326-48	210326-48				
			Lab Sample No.(s)	23974984	23974985				
			AGS Reference						
Methyl tertiary butyl ether (MTBE)	<3 µg/l	TM245		<3 #	<3 #				
Benzene	<7 µg/l	TM245		<7 #	<7 #				
Toluene	<4 µg/l	TM245		<4 #	<4 #				
Ethylbenzene	<5 µg/l	TM245		<5 #	<5 #				
m,p-Xylene	<8 µg/l	TM245		<8 #	<8 #				
o-Xylene	<3 µg/l	TM245		<3 #	<3 #				
Sum of detected BTEX	<28 µg/l	TM245		<28	<28				
GRO >C5-C10	<10 µg/l	TM245		<10	<10				
EPH (C6-C10)	<100 µg/l	TM245		<100	<100				

Table of Results - Appendix

Method No	Reference	Description
TM022	Method 2540D, AWWA/APHA, 20th Ed., 1999 / BS 2690: Part120 1981;BS EN 872	Determination of total suspended solids in waters
TM099	BS 2690: Part 7:1968 / BS 6068: Part2.11:1984	Determination of Ammonium in Water Samples using the Kone Analyser
TM120	Method 2510B, AWWA/APHA, 20th Ed., 1999 / BS 2690: Part 9:1970	Determination of Electrical Conductivity using a Conductivity Meter
TM152	Method 3125B, AWWA/APHA, 20th Ed., 1999	Analysis of Aqueous Samples by ICP-MS
TM172	Analysis of Petroleum Hydrocarbons in Environmental Media – Total Petroleum Hydrocarbon Criteria	EPH in Waters
TM183	BS EN 23506:2002, (BS 6068-2.74:2002) ISBN 0 580 38924 3	Determination of Trace Level Mercury in Waters and Leachates by PSA Cold Vapour Atomic Fluorescence Spectrometry
TM184	EPA Methods 325.1 & 325.2,	The Determination of Anions in Aqueous Matrices using the Kone Spectrophotometric Analysers
TM235	The Determination of Hydrocarbon Oils in Waters by Solvent Extraction, Infra red Absorption and Gravimetry 1983, HMSO, London	Determination of Total Petroleum Hydrocarbons (TPH) in Waters By Infra-Red Spectroscopy
TM245	By GC-FID	Determination of GRO by Headspace in waters
TM256	The measurement of Electrical Conductivity and the Laboratory determination of pH Value of Natural, Treated and Wastewaters. HMSO, 1978. ISBN 011 751428 4.	Determination of pH in Water and Leachate using the GLpH pH Meter

NA = not applicable.

Chemical testing (unless subcontracted) performed at ALS Life Sciences Ltd Hawarden (Method codes TM) or ALS Life Sciences Ltd Aberdeen (Method codes S).

CERTIFICATE OF ANALYSIS

SDG:	210326-48	**Client Reference:**		**Report Number:**	593080
Location:	AMG Llanelli	**Order Number:**		**Superseded Report:**	

Test Completion Dates

Lab Sample No(s)	23974984	23974985
Customer Sample Ref.	BH1	BH5
AGS Ref.		
Depth		
Type	Ground Water	Ground Water
Ammoniacal Nitrogen	31-Mar-2021	30-Mar-2021
Anions by Kone (w)	31-Mar-2021	31-Mar-2021
Conductivity (at 20 deg.C)	30-Mar-2021	30-Mar-2021
Dissolved Metals by ICP-MS	31-Mar-2021	01-Apr-2021
EPH (DRO) (C10-C40) Aqueous (W)	07-Apr-2021	01-Apr-2021
GRO by GC-FID (W)	31-Mar-2021	31-Mar-2021
Mercury Dissolved	31-Mar-2021	06-Apr-2021
Nitrite by Kone (w)	29-Mar-2021	29-Mar-2021
pH Value	29-Mar-2021	29-Mar-2021
Suspended Solids	27-Mar-2021	28-Mar-2021
Total EPH (aq)	07-Apr-2021	01-Apr-2021
TPH by IR Oils and Greases	06-Apr-2021	06-Apr-2021

Appendix General

1. Results are expressed on a dry weight basis (dried at 35ºC) for all soil analyses except for the following: NRA and CEN Leach tests, flash point LOI, pH, ammonium as NH4 by the BRE method, VOC TICs and SVOC TICs.

2. If sufficient sample is received a sub sample will be retained free of charge for 30 days after analysis is completed (e-mailed) for all sample types unless the sample is destroyed on testing. The prepared soil sub sample that is analysed for asbestos will be retained for a period of 6 months after the analysis date. All bulk samples will be retained for a period of 6 months after the analysis date. All samples received and not scheduled will be disposed of one month after the date of receipt unless we are instructed to the contrary. Once the initial period has expired, a storage charge will be applied for each month or part thereof until the client cancels the request for sample storage. ALS reserve the right to charge for samples received and stored but not analysed.

3. With respect to turnaround, we will always endeavour to meet client requirements wherever possible, but turnaround times cannot be absolutely guaranteed due to so many variables beyond our control.

4. We take responsibility for any test performed by sub-contractors (marked with an asterisk). We endeavour to use UKAS/MCERTS Accredited Laboratories, who either complete a quality questionnaire or are audited by ourselves. For some determinands there are no UKAS/MCERTS Accredited Laboratories, in this instance a laboratory with a known track record will be utilised.

5. If no separate volatile sample is supplied by the client, or if a headspace or sediment is present in the volatile sample, the integrity of the data may be compromised. This will be flagged up as an invalid VOC on the test schedule and the result marked as deviating on the test certificate.

6. NDP - No determination possible due to insufficient/unsuitable sample.

7. Results relate only to the items tested.

8. LoDs (Limit of Detection) for wet tests reported on a dry weight basis are not corrected for moisture content.

9. **Surrogate recoveries** - Surrogates are added to your sample to monitor recovery of the test requested. A % recovery is reported, results are not corrected for the recovery measured. Typical recoveries for organics tests are 70-130%. Recoveries in soils are affected by organic rich or clay rich matrices. Waters can be affected by remediation fluids or high amounts of sediment. Test results are only ever reported if all of the associated quality checks pass; it is assumed that all recoveries outside of the values above are due to matrix affect.

10. Stones/debris are not routinely removed. We always endeavour to take a representative sub sample from the received sample.

11. In certain circumstances the method detection limit may be elevated due to the sample being outside the calibration range. Other factors that may contribute to this include possible interferences. In both cases the sample would be diluted which would cause the method detection limit to be raised.

12. Mercury results quoted on soils will not include volatile mercury as the analysis is performed on a dried and crushed sample.

13. For leachate preparations other than Zero Headspace Extraction (ZHE) volatile loss may occur.

14. For the BSEN 12457-3 two batch process to allow the cumulative release to be calculated, the volume of the leachate produced is measured and filtered for all tests. We therefore cannot carry out any unfiltered analysis. The tests affected include volatiles GCFID/GCMS and all subcontracted analysis.

15. Analysis and identification of specific compounds using GCFID is by retention time only, and we routinely calibrate and quantify for benzene, toluene, ethylbenzenes and xylenes (BTEX). For total volatiles in the C5-C12 range, the total area of the chromatogram is integrated and expressed as ug/kg or ug/l. Although this analysis is commonly used for the quantification of gasoline range organics (GRO), the system will also detect other compounds such as chlorinated solvents, and this may lead to a falsely high result with respect to hydrocarbons only. It is not possible to specifically identify these non-hydrocarbons, as standards are not routinely run for any other compounds, and for more definitive identification, volatiles by GCMS should be utilised.

16. We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally occurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample. Other coarse granular material such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

17. **Tentatively Identified Compounds (TICs)** are non-target peaks in VOC and SVOC analysis. All non-target peaks detected with a concentration above the LoD are subjected to a mass spectral library search. Non-target peaks with a library search confidence of >75% are reported based on the best mass spectral library match. When a non-target peak with a library search confidence of <75% is detected it is reported as "mixed hydrocarbons". Non-target compounds identified from the scan data are semi-quantified relative to one of the deuterated internal standards, under the same chromatographic conditions as the target compounds. This result is reported as a semi-quantitative value and reported as Tentatively Identified Compounds (TICs). TICs are outside the scope of UKAS accreditation and are not moisture corrected.

18. **Sample Deviations**

If a sample is classed as deviated then the associated results may be compromised.

1	**Container with Headspace provided for volatiles analysis**
2	**Incorrect container received**
3	**Deviation from method**
4	**Matrix interference**
♦	**Sample holding time exceeded in laboratory**
@	**Sample holding time exceeded due to late arrival of instructions or samples**
§	**Sampled on date not provided**

19. **Asbestos**

When requested, the individual sub sample scheduled will be analysed in house for the presence of asbestos fibres and asbestos containing material by our documented in house method TM048 based on HSG 248 (2005), which is accredited to ISO17025. If a specific asbestos fibre type is not found this will be reported as "Not detected". If no asbestos fibre types are found all will be reported as "Not detected" and the sub sample analysed deemed to be clear of asbestos. If an asbestos fibre type is found it will be reported as detected (for each fibre type found). Testing can be carried out on asbestos positive samples, but, due to Health and Safety considerations, may be replaced by alternative tests or reported as No Determination Possible (NDP). The quantity of asbestos present is not determined unless specifically requested.

Identification of Asbestos in Bulk Materials & Soils

The results for identification of asbestos in bulk materials are obtained from supplied bulk materials which have been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

The results for identification of asbestos in soils are obtained from a homogenised sub sample which has been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

Asbestos Type	Common Name
Chrysotile	White Asbestos
Amosite	Brown Asbestos
Crocidolite	Blue Asbestos
Fibrous Actinolite	-
Fibrous Anthophyllite	-
Fibrous Tremolite	-

Visual Estimation Of Fibre Content

Estimation of fibre content is not permitted as part of our UKAS accredited test other than: - Trace - Where only one or two asbestos fibres were identified.

Respirable Fibres

Respirable fibres are defined as fibres of <3 µm diameter, longer than 5 µm and with aspect ratios of at least 3:1 that can be inhaled into the lower regions of the lung and are generally acknowledged to be most important predictor of hazard and risk for cancers of the lung.
Standing Committee of Analysts, *The Quantification of Asbestos in Soil (2017).*

Further guidance on typical asbestos fibre content of manufactured products can be found in HSG 264.

The identification of asbestos containing materials and soils falls within our schedule of tests for which we hold UKAS accreditation, however opinions, interpretations and all other information contained in the report are outside the scope of UKAS accreditation.

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Attention: Ben Rees

CERTIFICATE OF ANALYSIS

Date of report Generation:	17 May 2021
Customer:	Geotechnology
Sample Delivery Group (SDG):	210508-27
Your Reference:	
Location:	AMG Llanelli
Report No:	598235

We received 2 samples on Saturday May 08, 2021 and 2 of these samples were scheduled for analysis which was completed on Monday May 17, 2021. Accredited laboratory tests are defined within the report, but opinions, interpretations and on-site data expressed herein are outside the scope of ISO 17025 accreditation.

Should this report require incorporation into client reports, it must be used in its entirety and not simply with the data sections alone.

Chemical testing (unless subcontracted) performed at ALS Life Sciences Ltd Hawarden (Method codes TM) or ALS Life Sciences Ltd Aberdeen (Method codes S).

All sample data is provided by the customer. The reported results relate to the sample supplied, and on the basis that this data is correct.
Incorrect sampling dates and/or sample information will affect the validity of results.
The customer is not permitted to reproduce this report except in full without the approval of the laboratory.

Approved By:

Sonia McWhan

Operations Manager

CERTIFICATE OF ANALYSIS

SDG:	210508-27	**Client Reference:**		**Report Number:**	598235
Location:	AMG Llanelli	**Order Number:**		**Superseded Report:**	

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
24233005	BH1			06/05/2021
24233004	BH5			06/05/2021

Only received samples which have had analysis scheduled will be shown on the following pages.

Validated

CERTIFICATE OF ANALYSIS

SDG:	210508-27	**Client Reference:**		**Report Number:**	598235
Location:	AMG Llanelli	**Order Number:**		**Superseded Report:**	

Results Legend

X Test

N No Determination Possible

Sample Types -

S - Soil/Solid
UNS - Unspecified Solid
GW - Ground Water
SW - Surface Water
LE - Land Leachate
PL - Prepared Leachate
PR - Process Water
SA - Saline Water
TE - Trade Effluent
TS - Treated Sewage
US - Untreated Sewage
RE - Recreational Water
DW - Drinking Water Non-regulatory
UNL - Unspecified Liquid
SL - Sludge
G - Gas
OTH - Other

Lab Sample No(s)									24233005				24233004	
Customer Sample Reference									BH1				BH5	
AGS Reference														
Depth (m)														
Container									250ml Amber Gl. PTFE/PE (ALE219)	500ml Plastic (ALE208)	H2SO4 (ALE244)	HNO3 Filtered (ALE204)	NaOH (ALE245)	Vial (ALE297)	250ml Amber Gl. PTFE/PE (ALE219)	500ml Plastic (ALE208)	H2SO4 (ALE244)	HNO3 Filtered (ALE204)	NaOH (ALE245)	Vial (ALE297)
Sample Type									GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW
Ammoniacal Nitrogen	All	NDPs: 0 Tests: 2									X						X			
Anions by Kone (w)	All	NDPs: 0 Tests: 2								X						X				
Conductivity (at 20 deg.C)	All	NDPs: 0 Tests: 2								X						X				
Dissolved Metals by ICP-MS	All	NDPs: 0 Tests: 2										X							X	
EPH (DRO) (C10-C40) Aqueous (W)	All	NDPs: 0 Tests: 2	X												X					
GRO by GC-FID (W)	All	NDPs: 0 Tests: 2						X						X						X
Mercury Dissolved	All	NDPs: 0 Tests: 2										X							X	
Nitrite by Kone (w)	All	NDPs: 0 Tests: 2					X													
pH Value	All	NDPs: 0 Tests: 2								X						X				
Suspended Solids	All	NDPs: 0 Tests: 2								X						X				
Total EPH (aq)	All	NDPs: 0 Tests: 2	X												X					
TPH by IR Oils and Greases	All	NDPs: 0 Tests: 2								X						X				

Validated

CERTIFICATE OF ANALYSIS

SDG:	210508-27	**Client Reference:**		**Report Number:**	598235
Location:	AMG Llanelli	**Order Number:**		**Superseded Report:**	

Results Legend	
#	ISO17025 accredited.
M	mCERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted - refer to subcontractor report for accreditation status.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-4+$@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	BH1	BH5				
			Depth (m)	.	.				
			Sample Type	Ground Water (GW)	Ground Water (GW)				
			Date Sampled	06/05/2021	06/05/2021				
			Sample Time	09:20:00	08:50:00				
			Date Received	08/05/2021	08/05/2021				
			SDG Ref	210508-27	210508-27				
			Lab Sample No.(s)	24233005	24233004				
			AGS Reference						
Suspended solids, Total	<2 mg/l	TM022		88.5 #	111 #				
Ammoniacal Nitrogen as N	<0.2 mg/l	TM099		<0.2 #	6.93 #				
Conductivity @ 20 deg.C	<0.02 mS/cm	TM120		1.01 #	13.7 #				
Arsenic (diss.filt)	<0.5 µg/l	TM152		40.5 #	1080 #				
Cadmium (diss.filt)	<0.08 µg/l	TM152		<0.08 #	0.13 #				
Chromium (diss.filt)	<1 µg/l	TM152		<1 #	<1 #				
Copper (diss.filt)	<0.3 µg/l	TM152		15.1 #	39.2 #				
Lead (diss.filt)	<0.2 µg/l	TM152		<0.2 #	2.4 #				
Nickel (diss.filt)	<0.4 µg/l	TM152		2.27 #	15.6 #				
Selenium (diss.filt)	<1 µg/l	TM152		1.67 #	1.42 #				
Zinc (diss.filt)	<1 µg/l	TM152		11.6 #	9.71 #				
EPH Range >C10 - C40 (aq)	<100 µg/l	TM172		167 #	2390 #				
Total EPH (C6-C40) (aq)	<100 µg/l	TM172		167	2390				
Mercury (diss.filt)	<0.01 µg/l	TM183		<0.01 #	0.269 #				
Nitrite as NO2	<0.05 mg/l	TM184		0.121 #	0.086 #				
Chloride	<2 mg/l	TM184		27.3 #	175 #				
Total Oxidised Nitrogen as N	<0.1 mg/l	TM184		0.705 #	<0.5 #				
TPH / Oil & Greases	<1 mg/l	TM235		<1	17.3				
pH	<1 pH Units	TM256		7.89 #	9.83 #				

Validated

CERTIFICATE OF ANALYSIS

SDG:	210508-27	**Client Reference:**		**Report Number:**	598235
Location:	AMG Llanelli	**Order Number:**		**Superseded Report:**	

GRO by GC-FID (W)

Results Legend

#	ISO17025 accredited.
M	mCERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted - refer to subcontractor report for accreditation status.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-4+$@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	BH1	BH5				
			Depth (m)	.	.				
			Sample Type	Ground Water (GW)	Ground Water (GW)				
			Date Sampled	06/05/2021	06/05/2021				
			Sample Time	09:20:00	08:50:00				
			Date Received	08/05/2021	08/05/2021				
			SDG Ref	210508-27	210508-27				
			Lab Sample No.(s)	24233005	24233004				
			AGS Reference						
Methyl tertiary butyl ether (MTBE)	<3 µg/l	TM245		<3 #	<3 #				
Benzene	<7 µg/l	TM245		<7 #	<7 #				
Toluene	<4 µg/l	TM245		<4 #	<4 #				
Ethylbenzene	<5 µg/l	TM245		<5 #	<5 #				
m,p-Xylene	<8 µg/l	TM245		<8 #	<8 #				
o-Xylene	<3 µg/l	TM245		<3 #	<3 #				
Sum of detected BTEX	<28 µg/l	TM245		<28	<28				
GRO >C5-C10	<10 µg/l	TM245		<10	<10				
EPH (C6-C10)	<100 µg/l	TM245		<100	<100				

Table of Results - Appendix

Method No	Reference	Description
TM022	Method 2540D, AWWA/APHA, 20th Ed., 1999 / BS 2690: Part120 1981;BS EN 872	Determination of total suspended solids in waters
TM099	BS 2690: Part 7:1968 / BS 6068: Part2.11:1984	Determination of Ammonium in Water Samples using the Kone Analyser
TM120	Method 2510B, AWWA/APHA, 20th Ed., 1999 / BS 2690: Part 9:1970	Determination of Electrical Conductivity using a Conductivity Meter
TM152	Method 3125B, AWWA/APHA, 20th Ed., 1999	Analysis of Aqueous Samples by ICP-MS
TM172	Analysis of Petroleum Hydrocarbons in Environmental Media – Total Petroleum Hydrocarbon Criteria	EPH in Waters
TM183	BS EN 23506:2002, (BS 6068-2.74:2002) ISBN 0 580 38924 3	Determination of Trace Level Mercury in Waters and Leachates by PSA Cold Vapour Atomic Fluorescence Spectrometry
TM184	EPA Methods 325.1 & 325.2,	The Determination of Anions in Aqueous Matrices using the Kone Spectrophotometric Analysers
TM235	The Determination of Hydrocarbon Oils in Waters by Solvent Extraction, Infra red Absorption and Gravimetry 1983, HMSO, London	Determination of Total Petroleum Hydrocarbons (TPH) in Waters By Infra-Red Spectroscopy
TM245	By GC-FID	Determination of GRO by Headspace in waters
TM256	The measurement of Electrical Conductivity and the Laboratory determination of pH Value of Natural, Treated and Wastewaters. HMSO, 1978. ISBN 011 751428 4.	Determination of pH in Water and Leachate using the GLpH pH Meter

NA = not applicable.

Chemical testing (unless subcontracted) performed at ALS Life Sciences Ltd Hawarden (Method codes TM) or ALS Life Sciences Ltd Aberdeen (Method codes S).

CERTIFICATE OF ANALYSIS

SDG:	210508-27	**Client Reference:**		**Report Number:**	598235
Location:	AMG Llanelli	**Order Number:**		**Superseded Report:**	

Test Completion Dates

Lab Sample No(s)	24233005	24233004
Customer Sample Ref.	BH1	BH5
AGS Ref.		
Depth		
Type	Ground Water	Ground Water
Ammoniacal Nitrogen	14-May-2021	14-May-2021
Anions by Kone (w)	13-May-2021	17-May-2021
Conductivity (at 20 deg.C)	12-May-2021	13-May-2021
Dissolved Metals by ICP-MS	13-May-2021	13-May-2021
EPH (DRO) (C10-C40) Aqueous (W)	13-May-2021	13-May-2021
GRO by GC-FID (W)	13-May-2021	13-May-2021
Mercury Dissolved	11-May-2021	13-May-2021
Nitrite by Kone (w)	14-May-2021	14-May-2021
pH Value	11-May-2021	11-May-2021
Suspended Solids	10-May-2021	10-May-2021
Total EPH (aq)	13-May-2021	13-May-2021
TPH by IR Oils and Greases	13-May-2021	13-May-2021

Appendix General

1. Results are expressed on a dry weight basis (dried at 35ºC) for all soil analyses except for the following: NRA and CEN Leach tests, flash point LOI, pH, ammonium as NH4 by the BRE method, VOC TICs and SVOC TICs.

2. If sufficient sample is received a sub sample will be retained free of charge for 30 days after analysis is completed (e-mailed) for all sample types unless the sample is destroyed on testing. The prepared soil sub sample that is analysed for asbestos will be retained for a period of 6 months after the analysis date. All bulk samples will be retained for a period of 6 months after the analysis date. All samples received and not scheduled will be disposed of one month after the date of receipt unless we are instructed to the contrary. Once the initial period has expired, a storage charge will be applied for each month or part thereof until the client cancels the request for sample storage. ALS reserve the right to charge for samples received and stored but not analysed.

3. With respect to turnaround, we will always endeavour to meet client requirements wherever possible, but turnaround times cannot be absolutely guaranteed due to so many variables beyond our control.

4. We take responsibility for any test performed by sub-contractors (marked with an asterisk). We endeavour to use UKAS/MCERTS Accredited Laboratories, who either complete a quality questionnaire or are audited by ourselves. For some determinands there are no UKAS/MCERTS Accredited Laboratories, in this instance a laboratory with a known track record will be utilised.

5. If no separate volatile sample is supplied by the client, or if a headspace or sediment is present in the volatile sample, the integrity of the data may be compromised. This will be flagged up as an invalid VOC on the test schedule and the result marked as deviating on the test certificate.

6. NDP - No determination possible due to insufficient/unsuitable sample.

7. Results relate only to the items tested.

8. LoDs (Limit of Detection) for wet tests reported on a dry weight basis are not corrected for moisture content.

9. **Surrogate recoveries** - Surrogates are added to your sample to monitor recovery of the test requested. A % recovery is reported, results are not corrected for the recovery measured. Typical recoveries for organics tests are 70-130%. Recoveries in soils are affected by organic rich or clay rich matrices. Waters can be affected by remediation fluids or high amounts of sediment. Test results are only ever reported if all of the associated quality checks pass; it is assumed that all recoveries outside of the values above are due to matrix affect.

10. Stones/debris are not routinely removed. We always endeavour to take a representative sub sample from the received sample.

11. In certain circumstances the method detection limit may be elevated due to the sample being outside the calibration range. Other factors that may contribute to this include possible interferences. In both cases the sample would be diluted which would cause the method detection limit to be raised.

12. Mercury results quoted on soils will not include volatile mercury as the analysis is performed on a dried and crushed sample.

13. For leachate preparations other than Zero Headspace Extraction (ZHE) volatile loss may occur.

14. For the BSEN 12457-3 two batch process to allow the cumulative release to be calculated, the volume of the leachate produced is measured and filtered for all tests. We therefore cannot carry out any unfiltered analysis. The tests affected include volatiles GCFID/GCMS and all subcontracted analysis.

15. Analysis and identification of specific compounds using GCFID is by retention time only, and we routinely calibrate and quantify for benzene, toluene, ethylbenzenes and xylenes (BTEX). For total volatiles in the C5-C12 range, the total area of the chromatogram is integrated and expressed as ug/kg or ug/l. Although this analysis is commonly used for the quantification of gasoline range organics (GRO), the system will also detect other compounds such as chlorinated solvents, and this may lead to a falsely high result with respect to hydrocarbons only. It is not possible to specifically identify these non-hydrocarbons, as standards are not routinely run for any other compounds, and for more definitive identification, volatiles by GCMS should be utilised.

16. We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally occurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample. Other coarse granular material such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

17. **Tentatively Identified Compounds (TICs)** are non-target peaks in VOC and SVOC analysis. All non-target peaks detected with a concentration above the LoD are subjected to a mass spectral library search. Non-target peaks with a library search confidence of >75% are reported based on the best mass spectral library match. When a non-target peak with a library search confidence of <75% is detected it is reported as "mixed hydrocarbons". Non-target compounds identified from the scan data are semi-quantified relative to one of the deuterated internal standards, under the same chromatographic conditions as the target compounds. This result is reported as a semi-quantitative value and reported as Tentatively Identified Compounds (TICs). TICs are outside the scope of UKAS accreditation and are not moisture corrected.

18. **Sample Deviations**

If a sample is classed as deviated then the associated results may be compromised.

1	**Container with Headspace provided for volatiles analysis**
2	**Incorrect container received**
3	**Deviation from method**
4	**Matrix interference**
♦	**Sample holding time exceeded in laboratory**
@	**Sample holding time exceeded due to late arrival of instructions or samples**
§	**Sampled on date not provided**

19. **Asbestos**

When requested, the individual sub sample scheduled will be analysed in house for the presence of asbestos fibres and asbestos containing material by our documented in house method TM048 based on HSG 248 (2005), which is accredited to ISO17025. If a specific asbestos fibre type is not found this will be reported as "Not detected". If no asbestos fibre types are found all will be reported as "Not detected" and the sub sample analysed deemed to be clear of asbestos. If an asbestos fibre type is found it will be reported as detected (for each fibre type found). Testing can be carried out on asbestos positive samples, but, due to Health and Safety considerations, may be replaced by alternative tests or reported as No Determination Possible (NDP). The quantity of asbestos present is not determined unless specifically requested.

Identification of Asbestos in Bulk Materials & Soils

The results for identification of asbestos in bulk materials are obtained from supplied bulk materials which have been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

The results for identification of asbestos in soils are obtained from a homogenised sub sample which has been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

Asbestos Type	Common Name
Chrysotile	White Asbestos
Amosite	Brown Asbestos
Crocidolite	Blue Asbestos
Fibrous Actinolite	-
Fibrous Anthophyllite	-
Fibrous Tremolite	-

Visual Estimation Of Fibre Content

Estimation of fibre content is not permitted as part of our UKAS accredited test other than: - Trace - Where only one or two asbestos fibres were identified.

Respirable Fibres

Respirable fibres are defined as fibres of <3 µm diameter, longer than 5 µm and with aspect ratios of at least 3:1 that can be inhaled into the lower regions of the lung and are generally acknowledged to be most important predictor of hazard and risk for cancers of the lung.
Standing Committee of Analysts, *The Quantification of Asbestos in Soil (2017).*

Further guidance on typical asbestos fibre content of manufactured products can be found in HSG 264.

The identification of asbestos containing materials and soils falls within our schedule of tests for which we hold UKAS accreditation, however opinions, interpretations and all other information contained in the report are outside the scope of UKAS accreditation.

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Attention: Ben Rees

CERTIFICATE OF ANALYSIS

Date of report Generation:	09 October 2021
Customer:	Geotechnology
Sample Delivery Group (SDG):	211001-93
Your Reference:	
Location:	AMG Llanelli
Report No:	616497
Order Number:	L15409

We received 3 samples on Friday October 01, 2021 and 3 of these samples were scheduled for analysis which was completed on Saturday October 09, 2021. Accredited laboratory tests are defined within the report, but opinions, interpretations and on-site data expressed herein are outside the scope of ISO 17025 accreditation.

Should this report require incorporation into client reports, it must be used in its entirety and not simply with the data sections alone.

Chemical testing (unless subcontracted) performed at ALS Life Sciences Ltd Hawarden.

All sample data is provided by the customer. The reported results relate to the sample supplied, and on the basis that this data is correct.
Incorrect sampling dates and/or sample information will affect the validity of results.

Approved By:

Sonia McWhan

Operations Manager

CERTIFICATE OF ANALYSIS

SDG: 211001-93 **Report Number:** 616497 **Superseded Report:**
Client Ref.: **Location:** AMG Llanelli

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
25078494	BH5			29/09/2021
25078491	TP208			29/09/2021
25078492	TP316			29/09/2021

Only received samples which have had analysis scheduled will be shown on the following pages.

Validated

CERTIFICATE OF ANALYSIS

SDG: 211001-93 **Report Number:** 616497 **Superseded Report:**
Client Ref.: **Location:** AMG Llanelli

Results Legend

X Test

N No Determination Possible

Sample Types -
S - Soil/Solid
UNS - Unspecified Solid
GW - Ground Water
SW - Surface Water
LE - Land Leachate
PL - Prepared Leachate
PR - Process Water
SA - Saline Water
TE - Trade Effluent
TS - Treated Sewage
US - Untreated Sewage
RE - Recreational Water
DW - Drinking Water Non-regulatory
UNL - Unspecified Liquid
SL - Sludge
G - Gas
OTH - Other

			Lab Sample No(s)								
			25078494				25078491			25078492	
			Customer Sample Reference								
			BH5				TP208			TP316	
			AGS Reference								
			Depth (m)								
			Container	250ml Amber Gl. PTFE/PE (ALE219)	500ml Plastic (ALE208)	H2SO4 (ALE244)	Vial (ALE297)	1kg TUB with Handle (ALE260)	250g Amber Jar (ALE210)	60g VOC (ALE215)	1kg TUB with Handle (ALE260)	250g Amber Jar (ALE210)
			Sample Type	GW	GW	GW	GW	S	S	S	S	S
Alkalinity as CaCO3	All	NDPs: 0 Tests: 1		X							
Ammoniacal Nitrogen	All	NDPs: 0 Tests: 1			X						
Anions by Kone (w)	All	NDPs: 0 Tests: 1		X							
Asbestos ID in Solid Samples	All	NDPs: 0 Tests: 2					X			X	
Boron Water Soluble	All	NDPs: 0 Tests: 2						X			X
Chromium III	All	NDPs: 0 Tests: 2						X			X
Conductivity (at 20 deg.C)	All	NDPs: 0 Tests: 1		X							
Dissolved Metals by ICP-MS	All	NDPs: 0 Tests: 1		X							
EPH (DRO) (C10-C40) Aqueous (W)	All	NDPs: 0 Tests: 1	X								
EPH CWG GC (S)	All	NDPs: 0 Tests: 1						X			
GRO by GC-FID (S)	All	NDPs: 0 Tests: 1							X		
GRO by GC-FID (W)	All	NDPs: 0 Tests: 1				X					
Hexavalent Chromium (s)	All	NDPs: 0 Tests: 2						X			X
Metals in solid samples by OES	All	NDPs: 0 Tests: 2						X			X
PAH Spec MS - Aqueous (W)	All	NDPs: 0 Tests: 1	X								

Validated

CERTIFICATE OF ANALYSIS

SDG: 211001-93 **Report Number:** 616497 **Superseded Report:**
Client Ref.: **Location:** AMG Llanelli

Results Legend

X Test

N No Determination Possible

Sample Types -
S - Soil/Solid
UNS - Unspecified Solid
GW - Ground Water
SW - Surface Water
LE - Land Leachate
PL - Prepared Leachate
PR - Process Water
SA - Saline Water
TE - Trade Effluent
TS - Treated Sewage
US - Untreated Sewage
RE - Recreational Water
DW - Drinking Water Non-regulatory
UNL - Unspecified Liquid
SL - Sludge
G - Gas
OTH - Other

			Lab Sample No(s)								
			25078494					25078491			25078492
			Customer Sample Reference								
			BH5					TP208			TP316
			AGS Reference								
			Depth (m)								
			Container	250ml Amber Gl. PTFE/PE (ALE219)	500ml Plastic (ALE208)	H2SO4 (ALE244)	Vial (ALE297)	1kg TUB with Handle (ALE260)	250g Amber Jar (ALE210)	60g VOC (ALE215)	1kg TUB with Handle (ALE260)	250g Amber Jar (ALE210)
			Sample Type	GW	GW	GW	GW	S	S	S	S	S
pH	All	NDPs: 0 Tests: 2							X			X
pH Value	All	NDPs: 0 Tests: 1		X								
Sample description	All	NDPs: 0 Tests: 2							X			X
Total EPH (aq)	All	NDPs: 0 Tests: 1	X									
Total Metals by ICP-MS	All	NDPs: 0 Tests: 1		X								
Total Organic Carbon	All	NDPs: 0 Tests: 2							X			X
TPH by IR Oils and Greases	All	NDPs: 0 Tests: 1		X								
TPH CWG GC (S)	All	NDPs: 0 Tests: 1							X			
VOC MS (S)	All	NDPs: 0 Tests: 1								X		
VOC MS (W)	All	NDPs: 0 Tests: 1					X					

CERTIFICATE OF ANALYSIS

SDG: 211001-93 **Report Number:** 616497 **Superseded Report:**
Client Ref.: **Location:** AMG Llanelli

Sample Descriptions

Grain Sizes

very fine	<0.063mm	fine	0.063mm - 0.1mm	medium	0.1mm - 2mm	coarse	2mm - 10mm	very coarse	>10mm

Lab Sample No(s)	Customer Sample Ref.	Depth (m)	Colour	Description	Inclusions	Inclusions 2
25078491	TP208		Dark Brown	Loamy Sand	Stones	Vegetation
25078492	TP316		Dark Brown	Loamy Sand	Stones	Vegetation

These descriptions are only intended to act as a cross check if sample identities are questioned, and to provide a log of sample matrices with respect to MCERTS validation. They are not intended as full geological descriptions.

We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally ocurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample.

Other coarse granular materials such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

CERTIFICATE OF ANALYSIS

SDG: 211001-93 **Report Number:** 616497 **Superseded Report:**
Client Ref.: **Location:** AMG Llanelli

Results Legend
- # ISO17025 accredited.
- M mCERTS accredited.
- aq Aqueous / settled sample.
- diss.filt Dissolved / filtered sample.
- tot.unfilt Total / unfiltered sample.
- * Subcontracted - refer to subcontractor report for accreditation status.
- ** % recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
- (F) Trigger breach confirmed
- 1-4+$@ Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	BH5	TP208	TP316			
			Depth (m)	.	.	.			
			Sample Type	Ground Water (GW)	Soil/Solid (S)	Soil/Solid (S)			
			Date Sampled	29/09/2021	29/09/2021	29/09/2021			
			Sample Time	09:20:00	11:10:00	10:59:00			
			Date Received	01/10/2021	01/10/2021	01/10/2021			
			SDG Ref	211001-93	211001-93	211001-93			
			Lab Sample No.(s)	25078494	25078491	25078492			
			AGS Reference						
Alkalinity, Total as CaCO3	<2 mg/l	TM043		10500 #					
Ammoniacal Nitrogen as N	<0.2 mg/l	TM099		14.9 #					
Conductivity @ 20 deg.C	<0.02 mS/cm	TM120		15 #					
Aluminium (diss.filt)	<10 µg/l	TM152		1040 2 #					
Aluminium (tot.unfilt)	<10 µg/l	TM152		29700 2 #					
Arsenic (diss.filt)	<0.5 µg/l	TM152		2200 2 #					
Arsenic (tot.unfilt)	<2 µg/l	TM152		2550 2 #					
Cadmium (diss.filt)	<0.08 µg/l	TM152		<0.8 2 #					
Cadmium (tot.unfilt)	<0.5 µg/l	TM152		1.48 2 #					
Chromium (tot.unfilt)	<3 µg/l	TM152		50.7 2 #					
Chromium (diss.filt)	<1 µg/l	TM152		<10 2 #					
Copper (tot.unfilt)	<1 µg/l	TM152		4270 2 #					
Lead (tot.unfilt)	<1 µg/l	TM152		609 2 #					
Copper (diss.filt)	<0.3 µg/l	TM152		142 2 #					
Manganese (tot.unfilt)	<1 µg/l	TM152		3190 2 #					
Lead (diss.filt)	<0.2 µg/l	TM152		5.34 2 #					
Nickel (tot.unfilt)	<1 µg/l	TM152		300 2 #					
Manganese (diss.filt)	<3 µg/l	TM152		39.8 2 #					
Nickel (diss.filt)	<0.4 µg/l	TM152		105 2 #					
Tin (tot.unfilt)	<3 µg/l	TM152		5790 2 #					
Zinc (tot.unfilt)	<5 µg/l	TM152		1540 2 #					
Zinc (diss.filt)	<1 µg/l	TM152		17.9 2 #					
Tin (Diss.Filt)	<1 µg/l	TM152		134 2 #					
Sodium (Dis.Filt)	<0.076 mg/l	TM152		4840 2 #					
Magnesium (Dis.Filt)	<0.036 mg/l	TM152		2.66 2 #					
Potassium (Dis.Filt)	<0.2 mg/l	TM152		55 2 #					
Calcium (Dis.Filt)	<0.2 mg/l	TM152		4.98 2 #					
Iron (Dis.Filt)	<0.019 mg/l	TM152		1.84 2 #					
Sodium (Tot. Unfilt.)	<0.047 mg/l	TM152		4650 2 #					
Magnesium (Tot. Unfilt.)	<0.05 mg/l	TM152		14.1 2 #					
Potassium (Tot. Unfilt.)	<0.2 mg/l	TM152		59.5 2 #					
Calcium (Tot. Unfilt.)	<0.057 mg/l	TM152		41.2 2 #					
Iron (Tot. Unfilt.)	<0.024 mg/l	TM152		69.2 2 #					

CERTIFICATE OF ANALYSIS

SDG: 211001-93 **Report Number:** 616497 **Superseded Report:**
Client Ref.: **Location:** AMG Llanelli

Results Legend
- # ISO17025 accredited.
- M mCERTS accredited.
- aq Aqueous / settled sample.
- diss.filt Dissolved / filtered sample.
- tot.unfilt Total / unfiltered sample.
- * Subcontracted - refer to subcontractor report for accreditation status.
- ** % recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
- (F) Trigger breach confirmed
- 1-4+§@ Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	BH5	TP208	TP316			
			Depth (m)	.	.	.			
			Sample Type	Ground Water (GW)	Soil/Solid (S)	Soil/Solid (S)			
			Date Sampled	29/09/2021	29/09/2021	29/09/2021			
			Sample Time	09:20:00	11:10:00	10:59:00			
			Date Received	01/10/2021	01/10/2021	01/10/2021			
			SDG Ref	211001-93	211001-93	211001-93			
			Lab Sample No.(s)	25078494	25078491	25078492			
			AGS Reference						
EPH Range >C10 - C40 (aq)	<100 µg/l	TM172		1870 #					
Total EPH (C6-C40) (aq)	<100 µg/l	TM172		1870					
Sulphate	<2 mg/l	TM184		265 #					
Chloride	<2 mg/l	TM184		324 #					
TPH / Oil & Greases	<1 mg/l	TM235		18.8					
pH	<1 pH Units	TM256		9.83 #					
Moisture Content Ratio (% of as received sample)	%	PM024			10	20			
Soil Organic Matter (SOM)	<0.35 %	TM132			22.6 #	34.1 #			
pH	1 pH Units	TM133			9.8 M	8 M			
Chromium, Hexavalent	<0.6 mg/kg	TM151			<0.6 #	<0.6 #			
Chromium, Trivalent	<0.9 mg/kg	TM181			<0.9	<0.9			
Arsenic	<0.6 mg/kg	TM181			218 M	81.8 M			
Cadmium	<0.02 mg/kg	TM181			3.85 M	1.79 M			
Chromium	<0.9 mg/kg	TM181			<0.9 M	<9 M			
Copper	<1.4 mg/kg	TM181			6380 M	613 M			
Lead	<0.7 mg/kg	TM181			267 M	199 M			
Mercury	<0.1 mg/kg	TM181			0.223 M	<1 M			
Nickel	<0.2 mg/kg	TM181			26.8 M	84.8 M			
Selenium	<1 mg/kg	TM181			<1 #	<10 #			
Tin	<0.24 mg/kg	TM181			1990 #	11900 #			
Zinc	<1.9 mg/kg	TM181			3370 M	463 M			
Boron, water soluble	<1 mg/kg	TM222			<1 M	<1 M			

CERTIFICATE OF ANALYSIS

SDG: 211001-93 **Report Number:** 616497 **Superseded Report:**
Client Ref.: **Location:** AMG Llanelli

GRO by GC-FID (W)

Results Legend	
#	ISO17025 accredited.
M	mCERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted - refer to subcontractor report for accreditation status.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-4+$@	Sample deviation (see appendix)

		Customer Sample Ref.	BH5
		Depth (m)	.
		Sample Type	Ground Water (GW)
		Date Sampled	29/09/2021
		Sample Time	09:20:00
		Date Received	01/10/2021
		SDG Ref	211001-93
		Lab Sample No.(s)	25078494
		AGS Reference	
Component	**LOD/Units**	**Method**	
GRO >C5-C10	<10 µg/l	TM245	<10
EPH (C6-C10)	<100 µg/l	TM245	<100

CERTIFICATE OF ANALYSIS

SDG: 211001-93 **Report Number:** 616497 **Superseded Report:**
Client Ref.: **Location:** AMG Llanelli

PAH Spec MS - Aqueous (W)

Results Legend	
#	ISO17025 accredited.
M	mCERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted - refer to subcontractor report for accreditation status.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-4+$@	Sample deviation (see appendix)

Customer Sample Ref.	BH5
Depth (m)	.
Sample Type	Ground Water (GW)
Date Sampled	29/09/2021
Sample Time	09:20:00
Date Received	01/10/2021
SDG Ref	211001-93
Lab Sample No.(s)	25078494
AGS Reference	

Component	LOD/Units	Method	
Naphthalene (aq)	<0.01 µg/l	TM178	0.0691 #
Acenaphthene (aq)	<0.005 µg/l	TM178	0.0388 #
Acenaphthylene (aq)	<0.005 µg/l	TM178	0.0591 #
Fluoranthene (aq)	<0.005 µg/l	TM178	2.08 #
Anthracene (aq)	<0.005 µg/l	TM178	0.138 #
Phenanthrene (aq)	<0.005 µg/l	TM178	0.889 #
Fluorene (aq)	<0.005 µg/l	TM178	0.0485 #
Chrysene (aq)	<0.005 µg/l	TM178	1.26 #
Pyrene (aq)	<0.005 µg/l	TM178	2.23 #
Benzo(a)anthracene (aq)	<0.005 µg/l	TM178	0.934 #
Benzo(b)fluoranthene (aq)	<0.005 µg/l	TM178	2.05 #
Benzo(k)fluoranthene (aq)	<0.005 µg/l	TM178	0.799 #
Benzo(a)pyrene (aq)	<0.002 µg/l	TM178	1.35 #
Dibenzo(a,h)anthracene (aq)	<0.005 µg/l	TM178	0.222 #
Benzo(g,h,i)perylene (aq)	<0.005 µg/l	TM178	1.16 #
Indeno(1,2,3-cd)pyrene (aq)	<0.005 µg/l	TM178	1.11 #
PAH, Total Detected USEPA 16 (aq)	<0.082 µg/l	TM178	14.4 #

CERTIFICATE OF ANALYSIS

SDG: 211001-93 **Report Number:** 616497 **Superseded Report:**
Client Ref.: **Location:** AMG Llanelli

TPH CWG (S)

Results Legend

#	ISO17025 accredited.
M	mCERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted - refer to subcontractor report for accreditation status.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-4+$@	Sample deviation (see appendix)

Customer Sample Ref.	TP208
Depth (m)	.
Sample Type	Soil/Solid (S)
Date Sampled	29/09/2021
Sample Time	11:10:00
Date Received	01/10/2021
SDG Ref	211001-93
Lab Sample No.(s)	25078491
AGS Reference	

Component	LOD/Units	Method	
GRO Surrogate % recovery**	%	TM089	32.5 4
Aliphatics >C5-C6 (HS_1D_AL)	<10 µg/kg	TM089	<10 4
Aliphatics >C6-C8 (HS_1D_AL)	<10 µg/kg	TM089	<10 4
Aliphatics >C8-C10 (HS_1D_AL)	<10 µg/kg	TM089	<10 4
Aliphatics >C10-C12 (EH_2D_AL_#1)	<1000 µg/kg	TM414	1330 #
Aliphatics >C12-C16 (EH_2D_AL_#1)	<1000 µg/kg	TM414	9070 #
Aliphatics >C16-C21 (EH_2D_AL_#1)	<1000 µg/kg	TM414	243000 #
Aliphatics >C21-C35 (EH_2D_AL_#1)	<1000 µg/kg	TM414	1740000 #
Aliphatics >C35-C44 (EH_2D_AL_#1)	<1000 µg/kg	TM414	773000
Total Aliphatics >C10-C44 (EH_2D_AR_#1)	<5000 µg/kg	TM414	2770000
Total Aliphatics & Aromatics >C10-C44 (EH_2D_Total_#1)	<10000 µg/kg	TM414	3430000
Aromatics >EC5-EC7 (HS_1D_AR)	<10 µg/kg	TM089	<10 4
Aromatics >EC7-EC8 (HS_1D_AR)	<10 µg/kg	TM089	<10 4
Aromatics >EC8-EC10 (HS_1D_AR)	<10 µg/kg	TM089	<10 4
Aromatics > EC10-EC12 (EH_2D_AR_#1)	<1000 µg/kg	TM414	<1000 #
Aromatics > EC12-EC16 (EH_2D_AR_#1)	<1000 µg/kg	TM414	10200 #
Aromatics > EC16-EC21 (EH_2D_AR_#1)	<1000 µg/kg	TM414	2490 #
Aromatics > EC21-EC35 (EH_2D_AR_#1)	<1000 µg/kg	TM414	637000 #
Aromatics >EC35-EC44 (EH_2D_AR_#1)	<1000 µg/kg	TM414	11400
Aromatics > EC40-EC44 (EH_2D_AR_#1)	<1000 µg/kg	TM414	<1000
Total Aromatics > EC10-EC44 (EH_2D_AR_#1)	<5000 µg/kg	TM414	661000
Total Aliphatics & Aromatics >C5-C44 (EH_2D_Total_#1+HS_1D_Total)	<10000 µg/kg	TM414	3430000
Total Aliphatics >C5-C10 (HS_1D_AL_TOTAL)	<50 µg/kg	TM089	<50 4
Total Aromatics >EC5-EC10 (HS_1D_AR_TOTAL)	<50 µg/kg	TM089	<50 4
GRO >C5-C10 (HS_1D_TOTAL)	<20 µg/kg	TM089	<20 4

CERTIFICATE OF ANALYSIS

SDG: 211001-93 **Report Number:** 616497 **Superseded Report:**
Client Ref.: **Location:** AMG Llanelli

VOC MS (S)

Results Legend	
#	ISO17025 accredited.
M	mCERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted - refer to subcontractor report for accreditation status.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-4+$@	Sample deviation (see appendix)

Customer Sample Ref.	TP208
Depth (m)	.
Sample Type	Soil/Solid (S)
Date Sampled	29/09/2021
Sample Time	11:10:00
Date Received	01/10/2021
SDG Ref	211001-93
Lab Sample No.(s)	25078491
AGS Reference	

Component	LOD/Units	Method	
Dibromofluoromethane**	%	TM116	104
Toluene-d8**	%	TM116	98
4-Bromofluorobenzene**	%	TM116	103
Methyl Tertiary Butyl Ether	<10 µg/kg	TM116	<2000 M
Benzene	<9 µg/kg	TM116	<1800 M
Toluene	<7 µg/kg	TM116	<1400 M
Ethylbenzene	<4 µg/kg	TM116	<800 M
p/m-Xylene	<10 µg/kg	TM116	<2000 #
o-Xylene	<10 µg/kg	TM116	<2000 M
Sum of Detected Xylenes	<0.02 mg/kg	TM116	<4
Sum of BTEX	<40 µg/kg	TM116	<8000

Validated

CERTIFICATE OF ANALYSIS

SDG: 211001-93 **Report Number:** 616497 **Superseded Report:**

Client Ref.: **Location:** AMG Llanelli

VOC MS (W)

Results Legend	
#	ISO17025 accredited.
M	mCERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted - refer to subcontractor report for accreditation status.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-4+$@	Sample deviation (see appendix)

Customer Sample Ref.	BH5
Depth (m)	.
Sample Type	Ground Water (GW)
Date Sampled	29/09/2021
Sample Time	09:20:00
Date Received	01/10/2021
SDG Ref	211001-93
Lab Sample No.(s)	25078494
AGS Reference	

Component	LOD/Units	Method	
Methyl tertiary butyl ether (MTBE)	<1 µg/l	TM208	<1 #
Benzene	<1 µg/l	TM208	<1 #
Toluene	<1 µg/l	TM208	<1 #
Ethylbenzene	<1 µg/l	TM208	<1 #
m,p-Xylene	<1 µg/l	TM208	<1 #
o-Xylene	<1 µg/l	TM208	<1 #
Sum of BTEX	<5 µg/l	TM208	<5

CERTIFICATE OF ANALYSIS

SDG: 211001-93 **Report Number:** 616497 **Superseded Report:**
Client Ref.: **Location:** AMG Llanelli

Asbestos Identification - Solid Samples

Results Legend

#	ISO17025 accredited.
M	*m*CERTS accredited.
*	Subcontracted test.
(F)	Trigger breach confirmed
1-5&♦§@	Sample deviation (see appendix)

		Date of Analysis	Analysed By	Comments	Amosite (Brown) Asbestos	Chrysotile (White) Asbestos	Crocidolite (Blue) Asbestos	Fibrous Actinolite	Fibrous Anthophyllite	Fibrous Tremolite	Non-Asbestos Fibre
Cust. Sample Ref.	TP208	04/10/2021	Marcin Magdziarek	Fibre bundles in soil	Not Detected (#)	Not Detected (#)	Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Depth (m)											
Sample Type	SOLID										
Date Sampled	29/09/2021 00:00:00										
Date Received	01/10/2021 05:00:00										
SDG	211001-93										
Original Sample	25078491										
Method Number	TM048										
Cust. Sample Ref.	TP316	04/10/2021	Marcin Magdziarek	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Depth (m)											
Sample Type	SOLID										
Date Sampled	29/09/2021 00:00:00										
Date Received	01/10/2021 05:00:00										
SDG	211001-93										
Original Sample	25078492										
Method Number	TM048										

Table of Results - Appendix

Method No	Reference	Description
PM024	Modified BS 1377	Soil preparation including homogenisation, moisture screens of soils for Asbestos Containing Material
TM043	Method 2320B, AWWA/APHA, 20th Ed., 1999 / BS 2690: Part109 1984	Determination of alkalinity in aqueous samples
TM048	HSG 248, Asbestos: The analysts' guide for sampling, analysis and clearance procedures	Identification of Asbestos in Bulk Material
TM089	Modified: US EPA Methods 8020 & 602	Determination of Gasoline Range Hydrocarbons (GRO) by Headspace GC-FID (C4-C12)
TM099	BS 2690: Part 7:1968 / BS 6068: Part2.11:1984	Determination of Ammonium in Water Samples using the Kone Analyser
TM116	Modified: US EPA Method 8260, 8120, 8020, 624, 610 & 602	Determination of Volatile Organic Compounds by Headspace / GC-MS
TM120	Method 2510B, AWWA/APHA, 20th Ed., 1999 / BS 2690: Part 9:1970	Determination of Electrical Conductivity using a Conductivity Meter
TM132	In - house Method	ELTRA CS800 Operators Guide
TM133	BS 1377: Part 3 1990;BS 6068-2.5	Determination of pH in Soil and Water using the GLpH pH Meter
TM151	Method 3500D, AWWA/APHA, 20th Ed., 1999	Determination of Hexavalent Chromium using Kone analyser
TM152	Method 3125B, AWWA/APHA, 20th Ed., 1999	Analysis of Aqueous Samples by ICP-MS
TM172	Analysis of Petroleum Hydrocarbons in Environmental Media – Total Petroleum Hydrocarbon Criteria	EPH in Waters
TM178	Modified: US EPA Method 8100	Determination of Polynuclear Aromatic Hydrocarbons (PAH) by GC-MS in Waters
TM181	US EPA Method 6010B	Determination of Routine Metals in Soil by iCap 6500 Duo ICP-OES
TM184	EPA Methods 325.1 & 325.2,	The Determination of Anions in Aqueous Matrices using the Kone Spectrophotometric Analysers
TM208	Modified: US EPA Method 8260b & 624	Determination of Volatile Organic Compounds by Headspace / GC-MS in Waters
TM222	In-House Method	Determination of Hot Water Soluble Boron in Soils (10:1 Water:Soil) by ICP OES.
TM235	The Determination of Hydrocarbon Oils in Waters by Solvent Extraction, Infra red Absorption and Gravimetry 1983, HMSO, London	Determination of Total Petroleum Hydrocarbons (TPH) in Waters By Infra-Red Spectroscopy
TM245	By GC-FID	Determination of GRO by Headspace in waters
TM256	The measurement of Electrical Conductivity and the Laboratory determination of pH Value of Natural, Treated and Wastewaters. HMSO, 1978. ISBN 011 751428 4.	Determination of pH in Water and Leachate using the GLpH pH Meter
TM414	Analysis of Petroleum Hydrocarbons in Environmental Media – Total Petroleum Hydrocarbon Criteria	Determination of Speciated Extractable Petroleum Hydrocarbons in Soils by GCxGC-FID

NA = not applicable.

Chemical testing (unless subcontracted) performed at ALS Life Sciences Ltd Hawarden.

CERTIFICATE OF ANALYSIS

SDG: 211001-93 **Report Number:** 616497 **Superseded Report:**
Client Ref.: **Location:** AMG Llanelli

Test Completion Dates

Lab Sample No(s)	25078494	25078491	25078492
Customer Sample Ref.	BH5	TP208	TP316
AGS Ref.			
Depth			
Type	Ground Water	Soil/Solid (S)	Soil/Solid (S)
Alkalinity as CaCO3	06-Oct-2021		
Ammoniacal Nitrogen	05-Oct-2021		
Anions by Kone (w)	06-Oct-2021		
Asbestos ID in Solid Samples		04-Oct-2021	04-Oct-2021
Boron Water Soluble		05-Oct-2021	05-Oct-2021
Chromium III		07-Oct-2021	07-Oct-2021
Conductivity (at 20 deg.C)	04-Oct-2021		
Dissolved Metals by ICP-MS	09-Oct-2021		
EPH (DRO) (C10-C40) Aqueous (W)	05-Oct-2021		
EPH CWG GC (S)		05-Oct-2021	
GRO by GC-FID (S)		08-Oct-2021	
GRO by GC-FID (W)	07-Oct-2021		
Hexavalent Chromium (s)		05-Oct-2021	05-Oct-2021
Metals in solid samples by OES		07-Oct-2021	07-Oct-2021
PAH Spec MS - Aqueous (W)	06-Oct-2021		
pH		05-Oct-2021	05-Oct-2021
pH Value	04-Oct-2021		
Sample description		01-Oct-2021	01-Oct-2021
Total EPH (aq)	08-Oct-2021		
Total Metals by ICP-MS	05-Oct-2021		
Total Organic Carbon		07-Oct-2021	08-Oct-2021
TPH by IR Oils and Greases	07-Oct-2021		
TPH CWG GC (S)		08-Oct-2021	
VOC MS (S)		08-Oct-2021	
VOC MS (W)	07-Oct-2021		

Appendix General

1. Results are expressed on a dry weight basis (dried at 35ºC) for all soil analyses except for the following: NRA and CEN Leach tests, flash point LOI, pH, ammonium as NH4 by the BRE method, VOC TICs and SVOC TICs.

2. If sufficient sample is received a sub sample will be retained free of charge for 30 days after analysis is completed (e-mailed) for all sample types unless the sample is destroyed on testing. The prepared soil sub sample that is analysed for asbestos will be retained for a period of 6 months after the analysis date. All bulk samples will be retained for a period of 6 months after the analysis date. All samples received and not scheduled will be disposed of one month after the date of receipt unless we are instructed to the contrary. Once the initial period has expired, a storage charge will be applied for each month or part thereof until the client cancels the request for sample storage. ALS reserve the right to charge for samples received and stored but not analysed.

3. With respect to turnaround, we will always endeavour to meet client requirements wherever possible, but turnaround times cannot be absolutely guaranteed due to so many variables beyond our control.

4. We take responsibility for any test performed by sub-contractors (marked with an asterisk). We endeavour to use UKAS/MCERTS Accredited Laboratories, who either complete a quality questionnaire or are audited by ourselves. For some determinands there are no UKAS/MCERTS Accredited Laboratories, in this instance a laboratory with a known track record will be utilised.

5. If no separate volatile sample is supplied by the client, or if a headspace or sediment is present in the volatile sample, the integrity of the data may be compromised. This will be flagged up as an invalid VOC on the test schedule and the result marked as deviating on the test certificate.

6. NDP - No determination possible due to insufficient/unsuitable sample.

7. Results relate only to the items tested.

8. LoDs (Limit of Detection) for wet tests reported on a dry weight basis are not corrected for moisture content.

9. **Surrogate recoveries** - Surrogates are added to your sample to monitor recovery of the test requested. A % recovery is reported, results are not corrected for the recovery measured. Typical recoveries for organics tests are 70-130%. Recoveries in soils are affected by organic rich or clay rich matrices. Waters can be affected by remediation fluids or high amounts of sediment. Test results are only ever reported if all of the associated quality checks pass; it is assumed that all recoveries outside of the values above are due to matrix affect.

10. Stones/debris are not routinely removed. We always endeavour to take a representative sub sample from the received sample.

11. In certain circumstances the method detection limit may be elevated due to the sample being outside the calibration range. Other factors that may contribute to this include possible interferences. In both cases the sample would be diluted which would cause the method detection limit to be raised.

12. For dried and crushed preparations of soils volatile loss may occur e.g volatile mercury.

13. For leachate preparations other than Zero Headspace Extraction (ZHE) volatile loss may occur.

14. For the BSEN 12457-3 two batch process to allow the cumulative release to be calculated, the volume of the leachate produced is measured and filtered for all tests. We therefore cannot carry out any unfiltered analysis. The tests affected include volatiles GCFID/GCMS and all subcontracted analysis.

15. Analysis and identification of specific compounds using GCFID is by retention time only, and we routinely calibrate and quantify for benzene, toluene, ethylbenzenes and xylenes (BTEX). For total volatiles in the C5-C12 range, the total area of the chromatogram is integrated and expressed as ug/kg or ug/l. Although this analysis is commonly used for the quantification of gasoline range organics (GRO), the system will also detect other compounds such as chlorinated solvents, and this may lead to a falsely high result with respect to hydrocarbons only. It is not possible to specifically identify these non-hydrocarbons, as standards are not routinely run for any other compounds, and for more definitive identification, volatiles by GCMS should be utilised.

16. We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally occurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample. Other coarse granular material such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

17 Data retention. All records, communications and reports pertaining to the analysis are archived for seven years from the date of issue of the final report.

18. **Tentatively Identified Compounds (TICs)** are non-target peaks in VOC and SVOC analysis. All non-target peaks detected with a concentration above the LoD are subjected to a mass spectral library search. Non-target peaks with a library search confidence of >75% are reported based on the best mass spectral library match. When a non-target peak with a library search confidence of <75% is detected it is reported as “mixed hydrocarbons”. Non-target compounds identified from the scan data are semi-quantified relative to one of the deuterated internal standards, under the same chromatographic conditions as the target compounds. This result is reported as a semi-quantitative value and reported as Tentatively Identified Compounds (TICs). TICs are outside the scope of UKAS accreditation and are not moisture corrected.

19. **Sample Deviations**

If a sample is classed as deviated then the associated results may be compromised.

1	**Container with Headspace provided for volatiles analysis**
2	**Incorrect container received**
3	**Deviation from method**
4	**Matrix interference**
♦	**Sample holding time exceeded in laboratory**
@	**Sample holding time exceeded due to late arrival of instructions or samples**
§	**Sampled on date not provided**

20. **Asbestos**

When requested, the individual sub sample scheduled will be analysed in house for the presence of asbestos fibres and asbestos containing material by our documented in house method TM048 based on HSG 248 (2005), which is accredited to ISO17025. If a specific asbestos fibre type is not found this will be reported as “Not detected”. If no asbestos fibre types are found all will be reported as “Not detected” and the sub sample analysed deemed to be clear of asbestos. If an asbestos fibre type is found it will be reported as detected (for each fibre type found). Testing can be carried out on asbestos positive samples, but, due to Health and Safety considerations, may be replaced by alternative tests or reported as No Determination Possible (NDP). The quantity of asbestos present is not determined unless specifically requested.

Identification of Asbestos in Bulk Materials & Soils

The results for identification of asbestos in bulk materials are obtained from supplied bulk materials which have been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

The results for identification of asbestos in soils are obtained from a homogenised sub sample which has been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining.

Asbestos Type	Common Name
Chrysotile	White Asbestos
Amosite	Brown Asbestos
Crocidolite	Blue Asbestos
Fibrous Actinolite	-
Fibrous Anthophyllite	-
Fibrous Tremolite	-

Visual Estimation Of Fibre Content

Estimation of fibre content is not permitted as part of our UKAS accredited test other than: - Trace - Where only one or two asbestos fibres were identified.

Respirable Fibres

Respirable fibres are defined as fibres of <3 µm diameter, longer than 5 µm and with aspect ratios of at least 3:1 that can be inhaled into the lower regions of the lung and are generally acknowledged to be most important predictor of hazard and risk for cancers of the lung.

Further guidance on typical asbestos fibre content of manufactured products can be found in HSG 264.

The identification of asbestos containing materials and soils falls within our schedule of tests for which we hold UKAS accreditation, however opinions, interpretations and all other information contained in the report are outside the scope of UKAS accreditation.

Unit 7-8 Hawarden Business Park
Manor Road (off Manor Lane)
Hawarden
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CH5 3US
Tel: (01244) 528700
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Geotechnology
5 Cefn-yr-Allt
Aberdulais
Neath
West Glamorgan
SA10 8HE

Attention: Ben Rees

CERTIFICATE OF ANALYSIS

Date of report Generation:	06 January 2022
Customer:	Geotechnology
Sample Delivery Group (SDG):	211214-48
Your Reference:	
Location:	AMG Llanelli
Report No:	628562
Order Number:	

This report has been revised and directly supersedes 627980 in its entirety.

We received 2 samples on Tuesday December 14, 2021 and 2 of these samples were scheduled for analysis which was completed on Thursday January 06, 2022. Accredited laboratory tests are defined within the report, but opinions, interpretations and on-site data expressed herein are outside the scope of ISO 17025 accreditation.

Should this report require incorporation into client reports, it must be used in its entirety and not simply with the data sections alone.

Chemical testing (unless subcontracted) performed at ALS Life Sciences Ltd Hawarden.

All sample data is provided by the customer. The reported results relate to the sample supplied, and on the basis that this data is correct.
Incorrect sampling dates and/or sample information will affect the validity of results.
The customer is not permitted to reproduce this report except in full without the approval of the laboratory.

Approved By:

Sonia McWhan

Operations Manager

CERTIFICATE OF ANALYSIS

SDG: 211214-48 **Report Number:** 628562 **Superseded Report:** 627980
Client Ref.: **Location:** AMG Llanelli

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
25521096	BH15			09/12/2021
25521097	RUNOFF			09/12/2021

Only received samples which have had analysis scheduled will be shown on the following pages.

Validated

CERTIFICATE OF ANALYSIS

SDG: 211214-48
Client Ref.:
Report Number: 628562
Location: AMG Llanelli
Superseded Report: 627980

Results Legend

- X — Test
- N — No Determination Possible

Sample Types -

- S - Soil/Solid
- UNS - Unspecified Solid
- GW - Ground Water
- SW - Surface Water
- LE - Land Leachate
- PL - Prepared Leachate
- PR - Process Water
- SA - Saline Water
- TE - Trade Effluent
- TS - Treated Sewage
- US - Untreated Sewage
- RE - Recreational Water
- DW - Drinking Water Non-regulatory
- UNL - Unspecified Liquid
- SL - Sludge
- G - Gas
- OTH - Other

Lab Sample No(s)			25521096						25521097						
Customer Sample Reference			BH15						RUNOFF						
AGS Reference															
Depth (m)															
Container			250ml Amber Gl. PTFE/PE (ALE219)	500ml Plastic (ALE208)	H2SO4 (ALE244)	HNO3 Filtered (ALE204)	NaOH (ALE245)	Vial (ALE297)	250ml Amber Gl. PTFE/PE (ALE219)	330ml plastic bottle (ALE503)	500ml Plastic (ALE208)	H2SO4 (ALE244)	HNO3 Unfiltered (ALE204)	NaOH (ALE245)	Vial (ALE297)
Sample Type			GW	GW	GW	GW	GW	GW	SW	SW	SW	SW	SW	SW	SW
Alkalinity as CaCO3	All	NDPs: 0 Tests: 1								X					
Ammoniacal Nitrogen	All	NDPs: 0 Tests: 2			X							X			
Anions by Kone (w)	All	NDPs: 0 Tests: 1								X					
Conductivity (at 20 deg.C)	All	NDPs: 0 Tests: 2		X						X					
Dissolved Metals by ICP-MS	All	NDPs: 0 Tests: 2				X				X					
EPH (DRO) (C10-C40) Aqueous (W)	All	NDPs: 0 Tests: 2		X							X				
GRO by GC-FID (W)	All	NDPs: 0 Tests: 2						X							X
Mercury Unfiltered	All	NDPs: 0 Tests: 1											X		
Nitrite by Kone (w)	All	NDPs: 0 Tests: 2					X							X	
pH Value	All	NDPs: 0 Tests: 2		X						X					
Suspended Solids	All	NDPs: 0 Tests: 2		X							X				
Total EPH (aq)	All	NDPs: 0 Tests: 2	X						X						
Total Metals by ICP-MS	All	NDPs: 0 Tests: 2		X									X		
TPH by IR Oils and Greases	All	NDPs: 0 Tests: 2	X						X						
VOC MS (W)	All	NDPs: 0 Tests: 2						X							X

13:21:08 06/01/2022

CERTIFICATE OF ANALYSIS

SDG: 211214-48 **Report Number:** 628562 **Superseded Report:** 627980
Client Ref.: **Location:** AMG Llanelli

Results Legend
- # ISO17025 accredited.
- M mCERTS accredited.
- aq Aqueous / settled sample.
- diss.filt Dissolved / filtered sample.
- tot.unfilt Total / unfiltered sample.
- * Subcontracted - refer to subcontractor report for accreditation status.
- ** % recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
- (F) Trigger breach confirmed
- 1-4+$@ Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	BH15	RUNOFF				
			Depth (m)	.	.				
			Sample Type	Ground Water (GW)	Surface Water (SW)				
			Date Sampled	09/12/2021	09/12/2021				
			Sample Time	13:20:00	13:50:00				
			Date Received	14/12/2021	14/12/2021				
			SDG Ref	211214-48	211214-48				
			Lab Sample No.(s)	25521096	25521097				
			AGS Reference						
Suspended solids, Total	<2 mg/l	TM022		94.8 #	1400 #				
Alkalinity, Total as CaCO3	<2 mg/l	TM043			535 #				
Ammoniacal Nitrogen as N	<0.2 mg/l	TM099		8.45 #	1.41 #				
Conductivity @ 20 deg.C	<0.02 mS/cm	TM120		11.4 #	0.706 #				
Aluminium (diss.filt)	<10 µg/l	TM152			20.8 2 #				
Aluminium (tot.unfilt)	<10 µg/l	TM152		870 2 #	16100 #				
Arsenic (diss.filt)	<0.5 µg/l	TM152		1150 #	2.26 2 #				
Arsenic (tot.unfilt)	<2 µg/l	TM152			50.9 #				
Cadmium (diss.filt)	<0.08 µg/l	TM152		0.0929 #	<0.08 2 #				
Cadmium (tot.unfilt)	<0.5 µg/l	TM152			7.27 #				
Chromium (tot.unfilt)	<3 µg/l	TM152			175 #				
Chromium (diss.filt)	<1 µg/l	TM152		<1 #	<1 2 #				
Copper (tot.unfilt)	<1 µg/l	TM152			1010 #				
Lead (tot.unfilt)	<1 µg/l	TM152			991 #				
Copper (diss.filt)	<0.3 µg/l	TM152		85.6 #	4.67 2 #				
Manganese (tot.unfilt)	<1 µg/l	TM152			3590 #				
Lead (diss.filt)	<0.2 µg/l	TM152		6.38 #	0.586 2 #				
Nickel (tot.unfilt)	<1 µg/l	TM152			114 #				
Manganese (diss.filt)	<3 µg/l	TM152		20.8 #	147 2 #				
Nickel (diss.filt)	<0.4 µg/l	TM152		13.7 #	22.2 2 #				
Tin (tot.unfilt)	<3 µg/l	TM152			2490 #				
Zinc (tot.unfilt)	<5 µg/l	TM152			5160 #				
Zinc (diss.filt)	<1 µg/l	TM152		12.3 #	21.2 2 #				
Tin (Diss.Filt)	<1 µg/l	TM152		57.5 #	1.08 2 #				
Sodium (Dis.Filt)	<0.076 mg/l	TM152		2930 #	76 2 #				
Magnesium (Dis.Filt)	<0.036 mg/l	TM152		3.94 #	3.33 2 #				
Potassium (Dis.Filt)	<0.2 mg/l	TM152		34.4 #	24.7 2 #				
Calcium (Dis.Filt)	<0.2 mg/l	TM152		3.46 #	49.1 2 #				
Iron (Dis.Filt)	<0.019 mg/l	TM152		0.863 #	0.334 2 #				
Sodium (Tot. Unfilt.)	<0.047 mg/l	TM152			51.2 #				
Magnesium (Tot. Unfilt.)	<0.05 mg/l	TM152			14.6 #				
Potassium (Tot. Unfilt.)	<0.2 mg/l	TM152			24.9 #				
Calcium (Tot. Unfilt.)	<0.057 mg/l	TM152			448 #				

CERTIFICATE OF ANALYSIS

SDG: 211214-48 **Report Number:** 628562 **Superseded Report:** 627980

Client Ref.: **Location:** AMG Llanelli

Results Legend

- # ISO17025 accredited.
- M mCERTS accredited.
- aq Aqueous / settled sample.
- diss.filt Dissolved / filtered sample.
- tot.unfilt Total / unfiltered sample.
- * Subcontracted - refer to subcontractor report for accreditation status.
- ** % recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
- (F) Trigger breach confirmed
- 1-4+§@ Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	BH15	RUNOFF
			Depth (m)	.	.
			Sample Type	Ground Water (GW)	Surface Water (SW)
			Date Sampled	09/12/2021	09/12/2021
			Sample Time	13:20:00	13:50:00
			Date Received	14/12/2021	14/12/2021
			SDG Ref	211214-48	211214-48
			Lab Sample No.(s)	25521096	25521097
			AGS Reference		
Iron (Tot. Unfilt.)	<0.024 mg/l	TM152			163 #
EPH Range >C10 - C40 (aq)	<100 µg/l	TM172		1780 #	84100 @ #
Total EPH (C6-C40) (aq)	<100 µg/l	TM172		1780	84100
Mercury (tot.unfilt)	<0.02 µg/l	TM183			0.631 @
Sulphate	<2 mg/l	TM184			98.3 #
Nitrite as N	<0.0152 mg/l	TM184		<0.0152 #	0.11 #
TPH / Oil & Greases	<1 mg/l	TM235		15	46.8 #
pH	<1 pH Units	TM256		9.8 #	7.92 #

Validated

CERTIFICATE OF ANALYSIS

SDG: 211214-48 **Report Number:** 628562 **Superseded Report:** 627980

Client Ref.: **Location:** AMG Llanelli

GRO by GC-FID (W)

Results Legend	
#	ISO17025 accredited.
M	mCERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted - refer to subcontractor report for accreditation status.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-4+$@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	BH15	RUNOFF
			Depth (m)	.	.
			Sample Type	Ground Water (GW)	Surface Water (SW)
			Date Sampled	09/12/2021	09/12/2021
			Sample Time	13:20:00	13:50:00
			Date Received	14/12/2021	14/12/2021
			SDG Ref	211214-48	211214-48
			Lab Sample No.(s)	25521096	25521097
			AGS Reference		
GRO >C5-C10	<10 µg/l	TM245		<10 @	30 @
EPH (C6-C10)	<100 µg/l	TM245		<100 @	<100 @

Validated

CERTIFICATE OF ANALYSIS

SDG: 211214-48 **Report Number:** 628562 **Superseded Report:** 627980

Client Ref.: **Location:** AMG Llanelli

VOC MS (W)

Results Legend	
#	ISO17025 accredited.
M	mCERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted - refer to subcontractor report for accreditation status.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-4+$@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	BH15	RUNOFF
			Depth (m)	.	.
			Sample Type	Ground Water (GW)	Surface Water (SW)
			Date Sampled	09/12/2021	09/12/2021
			Sample Time	13:20:00	13:50:00
			Date Received	14/12/2021	14/12/2021
			SDG Ref	211214-48	211214-48
			Lab Sample No.(s)	25521096	25521097
			AGS Reference		
Methyl tertiary butyl ether (MTBE)	<1 µg/l	TM208		<1 #	<1 #
Benzene	<1 µg/l	TM208		<1 #	<1 #
Toluene	<1 µg/l	TM208		<1 #	<1 #
Ethylbenzene	<1 µg/l	TM208		<1 #	<1 #
m,p-Xylene	<1 µg/l	TM208		<1 #	<1 #
o-Xylene	<1 µg/l	TM208		<1 #	<1 #
Sum of BTEX	<5 µg/l	TM208		<5	<5

Table of Results - Appendix

Method No	Reference	Description
TM022	Method 2540D, AWWA/APHA, 20th Ed., 1999 / BS 2690: Part120 1981;BS EN 872	Determination of total suspended solids in waters
TM043	Method 2320B, AWWA/APHA, 20th Ed., 1999 / BS 2690: Part109 1984	Determination of alkalinity in aqueous samples
TM099	BS 2690: Part 7:1968 / BS 6068: Part2.11:1984	Determination of Ammonium in Water Samples using the Kone Analyser
TM120	Method 2510B, AWWA/APHA, 20th Ed., 1999 / BS 2690: Part 9:1970	Determination of Electrical Conductivity using a Conductivity Meter
TM152	ISO 17294-2:2016 Water quality - Application of inductively coupled plasma mass spectrometry (ICP-MS)	Analysis of Aqueous Samples by ICP-MS
TM172	Analysis of Petroleum Hydrocarbons in Environmental Media – Total Petroleum Hydrocarbon Criteria	EPH in Waters
TM183	BS EN 23506:2002, (BS 6068-2.74:2002) ISBN 0 580 38924 3	Determination of Trace Level Mercury in Waters and Leachates by PSA Cold Vapour Atomic Fluorescence Spectrometry
TM184	EPA Methods 325.1 & 325.2,	The Determination of Anions in Aqueous Matrices using the Kone Spectrophotometric Analysers
TM208	Modified: US EPA Method 8260b & 624	Determination of Volatile Organic Compounds by Headspace / GC-MS in Waters
TM235	The Determination of Hydrocarbon Oils in Waters by Solvent Extraction, Infra red Absorption and Gravimetry 1983, HMSO, London	Determination of Total Petroleum Hydrocarbons (TPH) in Waters By Infra-Red Spectroscopy
TM245	By GC-FID	Determination of GRO by Headspace in waters
TM256	The measurement of Electrical Conductivity and the Laboratory determination of pH Value of Natural, Treated and Wastewaters. HMSO, 1978. ISBN 011 751428 4, Standard Methods for the examination of waters and wastewaters 20th Edition, PHA, Washington DC, USA. ISBN 0-87553-235-7 and The Determination of Alkalinity and Acidity in water HMSO, 1981, ISBN 0 11 751601 5.	Determination of pH, EC, TDS and Alkalinity in Aqueous samples

NA = not applicable.

Chemical testing (unless subcontracted) performed at ALS Life Sciences Ltd Hawarden.

CERTIFICATE OF ANALYSIS

SDG: 211214-48 **Report Number:** 628562 **Superseded Report:** 627980
Client Ref.: **Location:** AMG Llanelli

Test Completion Dates

Lab Sample No(s)	25521096	25521097
Customer Sample Ref.	BH15	RUNOFF
AGS Ref.		
Depth		
Type	Ground Water	Surface Water
Alkalinity as CaCO3		21-Dec-2021
Ammoniacal Nitrogen	21-Dec-2021	21-Dec-2021
Anions by Kone (w)		19-Dec-2021
Conductivity (at 20 deg.C)	21-Dec-2021	21-Dec-2021
Dissolved Metals by ICP-MS	23-Dec-2021	23-Dec-2021
EPH (DRO) (C10-C40) Aqueous (W)	23-Dec-2021	31-Dec-2021
GRO by GC-FID (W)	24-Dec-2021	30-Dec-2021
Mercury Unfiltered		06-Jan-2022
Nitrite by Kone (w)	20-Dec-2021	20-Dec-2021
pH Value	21-Dec-2021	21-Dec-2021
Suspended Solids	20-Dec-2021	20-Dec-2021
Total EPH (aq)	24-Dec-2021	31-Dec-2021
Total Metals by ICP-MS	21-Dec-2021	22-Dec-2021
TPH by IR Oils and Greases	22-Dec-2021	22-Dec-2021
VOC MS (W)	29-Dec-2021	29-Dec-2021

Appendix General

1. Results are expressed on a dry weight basis (dried at 35ºC) for all soil analyses except for the following: NRA and CEN Leach tests, flash point LOI, pH, ammonium as NH4 by the BRE method, VOC TICs and SVOC TICs.

2. If sufficient sample is received a sub sample will be retained free of charge for 30 days after analysis is completed (e-mailed) for all sample types unless the sample is destroyed on testing. The prepared soil sub sample that is analysed for asbestos will be retained for a period of 6 months after the analysis date. All bulk samples will be retained for a period of 6 months after the analysis date. All samples received and not scheduled will be disposed of one month after the date of receipt unless we are instructed to the contrary. Once the initial period has expired, a storage charge will be applied for each month or part thereof until the client cancels the request for sample storage. ALS reserve the right to charge for samples received and stored but not analysed.

3. With respect to turnaround, we will always endeavour to meet client requirements wherever possible, but turnaround times cannot be absolutely guaranteed due to so many variables beyond our control.

4. We take responsibility for any test performed by sub-contractors (marked with an asterisk). We endeavour to use UKAS/MCERTS Accredited Laboratories, who either complete a quality questionnaire or are audited by ourselves. For some determinands there are no UKAS/MCERTS Accredited Laboratories, in this instance a laboratory with a known track record will be utilised.

5. If no separate volatile sample is supplied by the client, or if a headspace or sediment is present in the volatile sample, the integrity of the data may be compromised. This will be flagged up as an invalid VOC on the test schedule and the result marked as deviating on the test certificate.

6. NDP - No determination possible due to insufficient/unsuitable sample.

7. Results relate only to the items tested.

8. LoDs (Limit of Detection) for wet tests reported on a dry weight basis are not corrected for moisture content.

9. **Surrogate recoveries** - Surrogates are added to your sample to monitor recovery of the test requested. A % recovery is reported, results are not corrected for the recovery measured. Typical recoveries for organics tests are 70-130%. Recoveries in soils are affected by organic rich or clay rich matrices. Waters can be affected by remediation fluids or high amounts of sediment. Test results are only ever reported if all of the associated quality checks pass; it is assumed that all recoveries outside of the values above are due to matrix affect.

10. Stones/debris are not routinely removed. We always endeavour to take a representative sub sample from the received sample.

11. In certain circumstances the method detection limit may be elevated due to the sample being outside the calibration range. Other factors that may contribute to this include possible interferences. In both cases the sample would be diluted which would cause the method detection limit to be raised.

12. For dried and crushed preparations of soils volatile loss may occur e.g volatile mercury.

13. For leachate preparations other than Zero Headspace Extraction (ZHE) volatile loss may occur.

14. For the BSEN 12457-3 two batch process to allow the cumulative release to be calculated, the volume of the leachate produced is measured and filtered for all tests. We therefore cannot carry out any unfiltered analysis. The tests affected include volatiles GCFID/GCMS and all subcontracted analysis.

15. Analysis and identification of specific compounds using GCFID is by retention time only, and we routinely calibrate and quantify for benzene, toluene, ethylbenzenes and xylenes (BTEX). For total volatiles in the C5-C12 range, the total area of the chromatogram is integrated and expressed as ug/kg or ug/l. Although this analysis is commonly used for the quantification of gasoline range organics (GRO), the system will also detect other compounds such as chlorinated solvents, and this may lead to a falsely high result with respect to hydrocarbons only. It is not possible to specifically identify these non-hydrocarbons, as standards are not routinely run for any other compounds, and for more definitive identification, volatiles by GCMS should be utilised.

16. We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally occurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample. Other coarse granular material such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

17 Data retention. All records, communications and reports pertaining to the analysis are archived for seven years from the date of issue of the final report.

18. **Tentatively Identified Compounds (TICs)** are non-target peaks in VOC and SVOC analysis. All non-target peaks detected with a concentration above the LoD are subjected to a mass spectral library search. Non-target peaks with a library search confidence of >75% are reported based on the best mass spectral library match. When a non-target peak with a library search confidence of <75% is detected it is reported as "mixed hydrocarbons". Non-target compounds identified from the scan data are semi-quantified relative to one of the deuterated internal standards, under the same chromatographic conditions as the target compounds. This result is reported as a semi-quantitative value and reported as Tentatively Identified Compounds (TICs). TICs are outside the scope of UKAS accreditation and are not moisture corrected.

19. **Sample Deviations**

If a sample is classed as deviated then the associated results may be compromised.

1	**Container with Headspace provided for volatiles analysis**
2	**Incorrect container received**
3	**Deviation from method**
4	**Matrix interference**
♦	**Sample holding time exceeded in laboratory**
@	**Sample holding time exceeded due to late arrival of instructions or samples**
§	**Sampled on date not provided**

20. **Asbestos**

When requested, the individual sub sample scheduled will be analysed in house for the presence of asbestos fibres and asbestos containing material by our documented in house method TM048 based on HSG 248 (2005), which is accredited to ISO17025. If a specific asbestos fibre type is not found this will be reported as "Not detected". If no asbestos fibre types are found all will be reported as "Not detected" and the sub sample analysed deemed to be clear of asbestos. If an asbestos fibre type is found it will be reported as detected (for each fibre type found). Testing can be carried out on asbestos positive samples, but, due to Health and Safety considerations, may be replaced by alternative tests or reported as No Determination Possible (NDP). The quantity of asbestos present is not determined unless specifically requested.

Identification of Asbestos in Bulk Materials & Soils

The results for identification of asbestos in bulk materials are obtained from supplied bulk materials which have been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

The results for identification of asbestos in soils are obtained from a homogenised sub sample which has been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining.

Asbestos Type	Common Name
Chrysotile	White Asbestos
Amosite	Brown Asbestos
Crocidolite	Blue Asbestos
Fibrous Actinolite	-
Fibrous Anthophyllite	-
Fibrous Tremolite	-

Visual Estimation Of Fibre Content

Estimation of fibre content is not permitted as part of our UKAS accredited test other than: - Trace - Where only one or two asbestos fibres were identified.

Respirable Fibres

Respirable fibres are defined as fibres of <3 µm diameter, longer than 5 µm and with aspect ratios of at least 3:1 that can be inhaled into the lower regions of the lung and are generally acknowledged to be most important predictor of hazard and risk for cancers of the lung.

Further guidance on typical asbestos fibre content of manufactured products can be found in HSG 264.

The identification of asbestos containing materials and soils falls within our schedule of tests for which we hold UKAS accreditation, however opinions, interpretations and all other information contained in the report are outside the scope of UKAS accreditation.

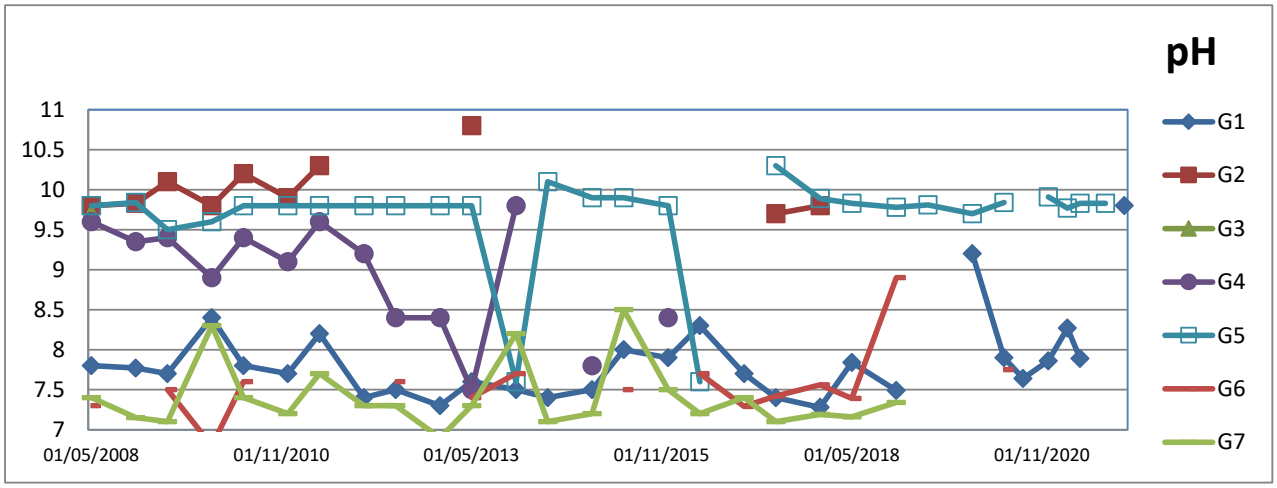
AMG RESOURCES LIMITED

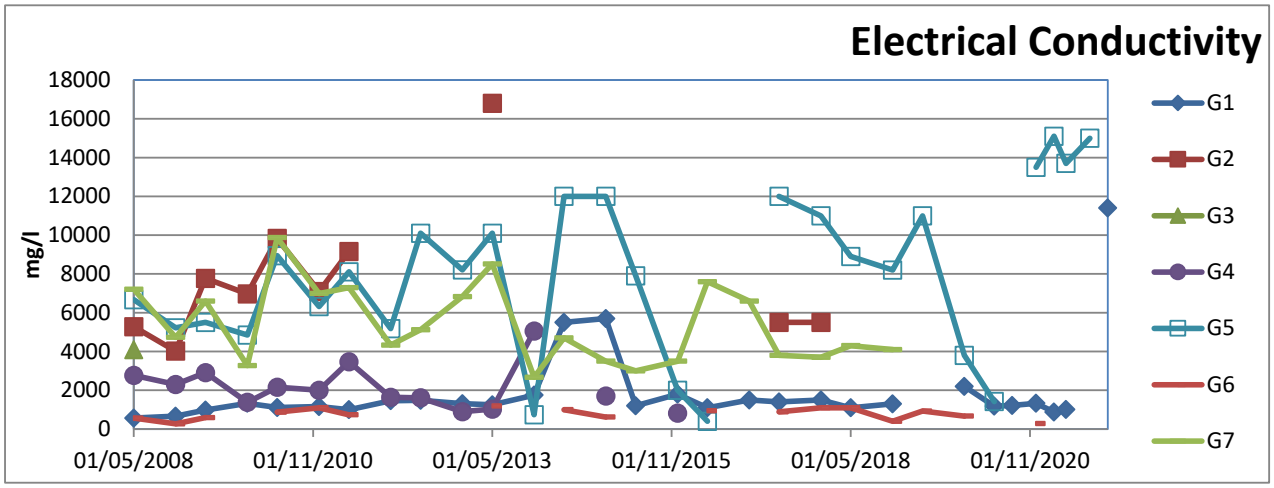
Permit number EPR/BM2381IQ

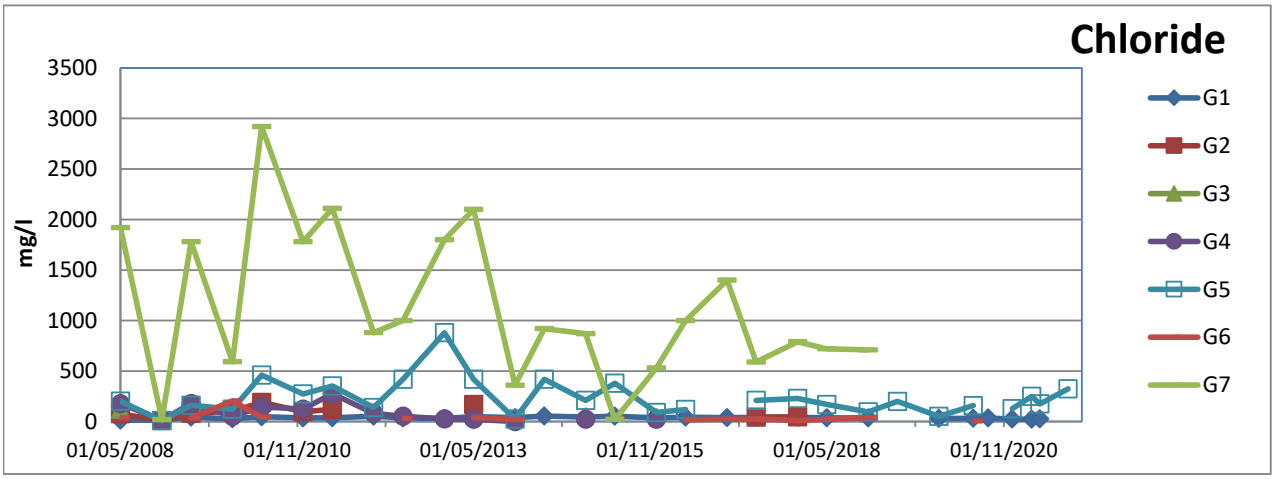
2021 Annual Review

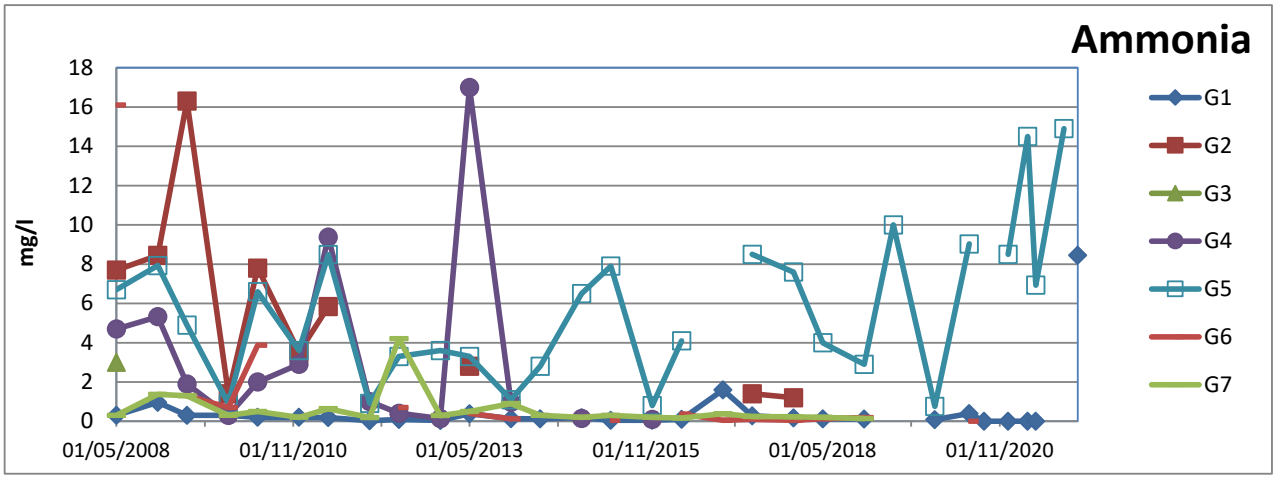
Appendix 3 Time Series Plots of Groundwater Monitoring Results

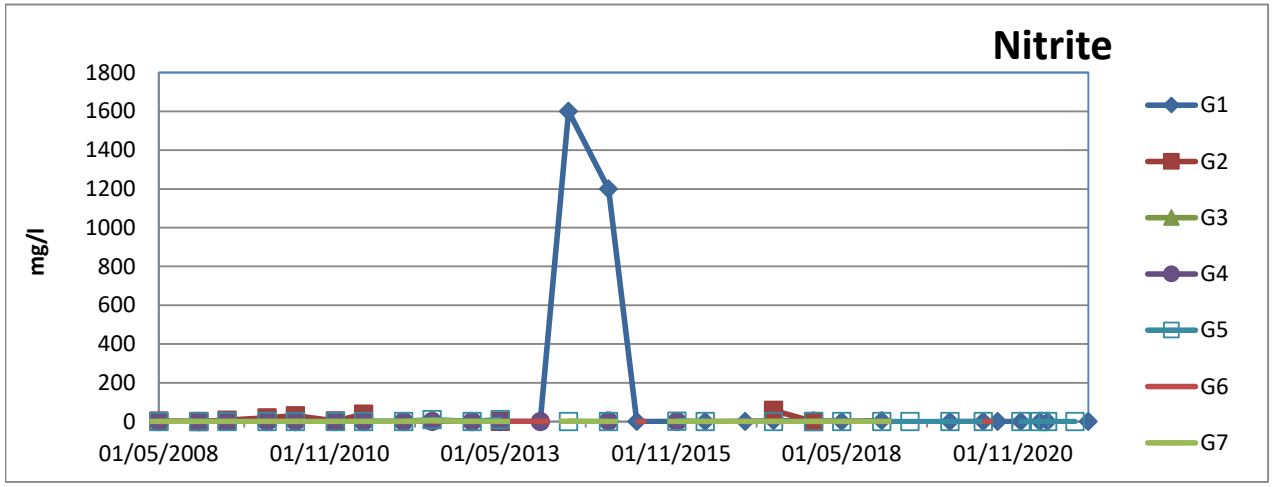
Report Number 2232r1v1d0222

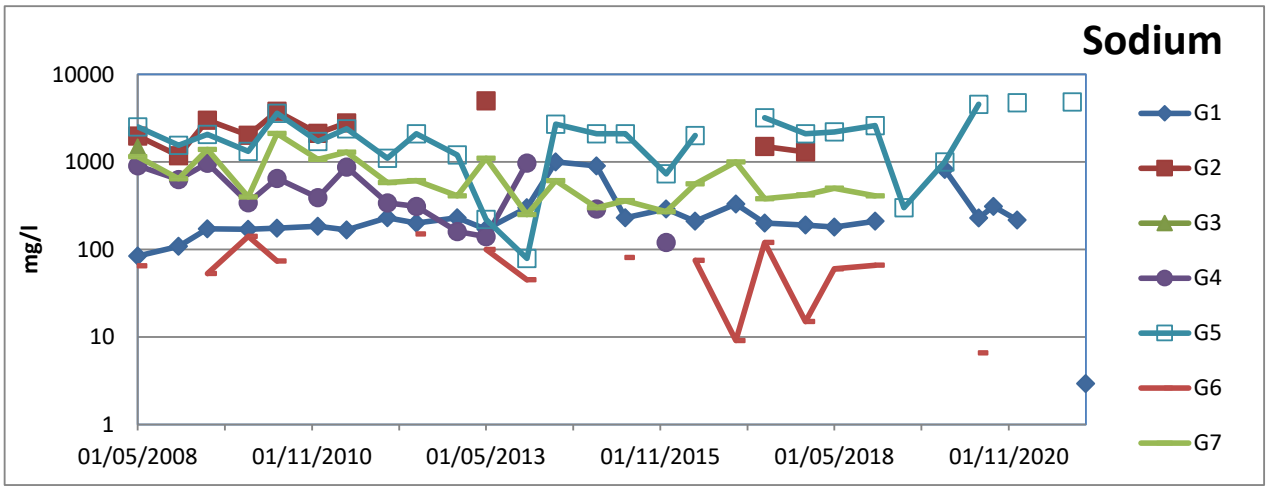

pH
11
10.5
10
9.5
9
8.5
8
7.5
7
01/05/2008
01/11/2010
01/05/2013
01/11/2015
01/05/2018
01/11/2020
G1
G2
G3
G4
G5
G6
G7

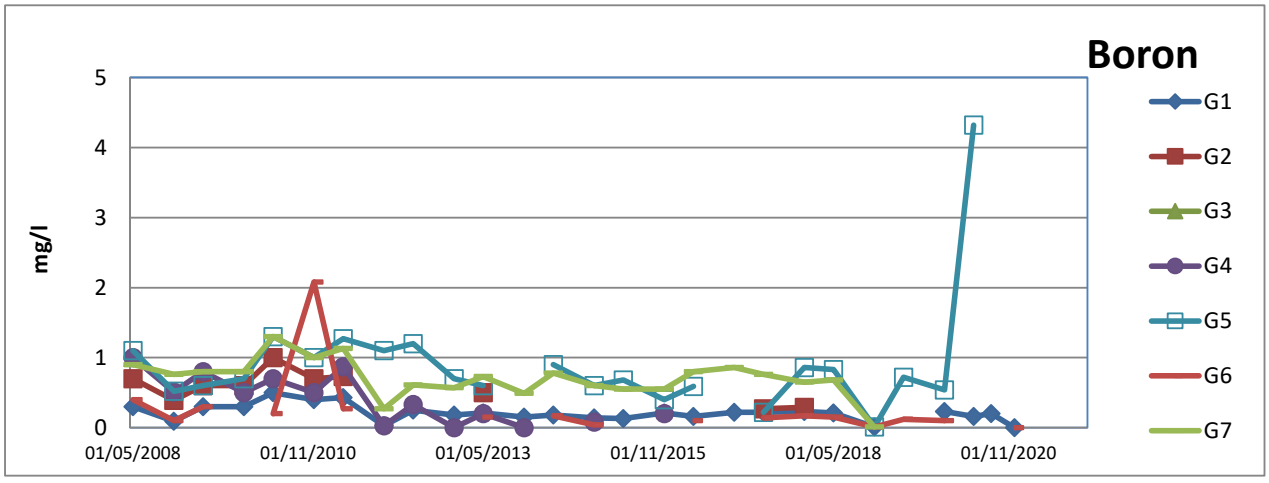

Electrical Conductivity
mg/l
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
01/05/2008
01/11/2010
01/05/2013
01/11/2015
01/05/2018
01/11/2020
G1
G2
G3
G4
G5
G6
G7

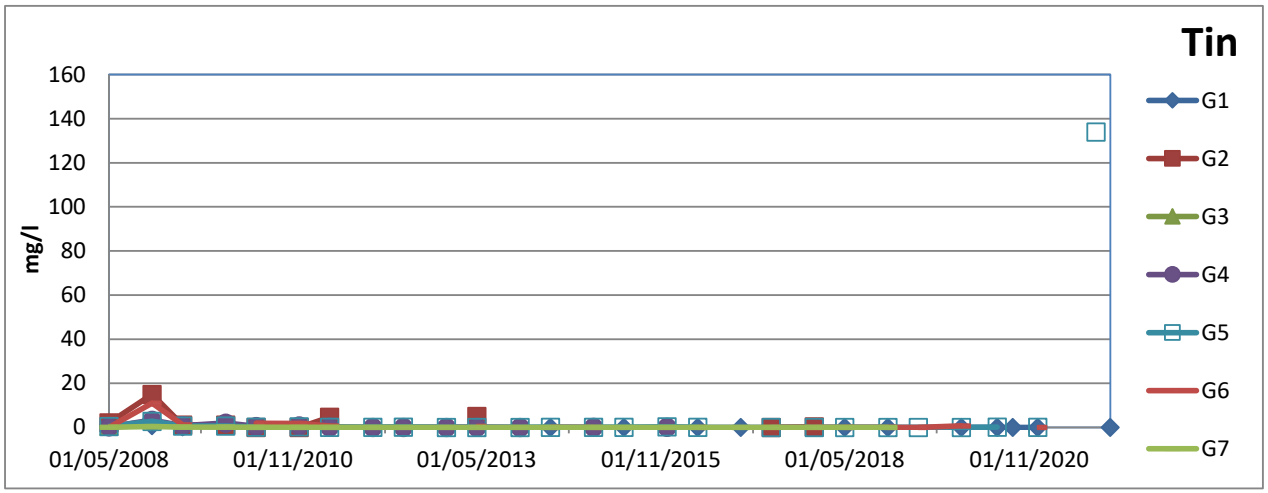

Chloride
mg/l
3500
3000
2500
2000
1500
1000
500
0
01/05/2008
01/11/2010
01/05/2013
01/11/2015
01/05/2018
01/11/2020
G1
G2
G3
G4
G5
G6
G7

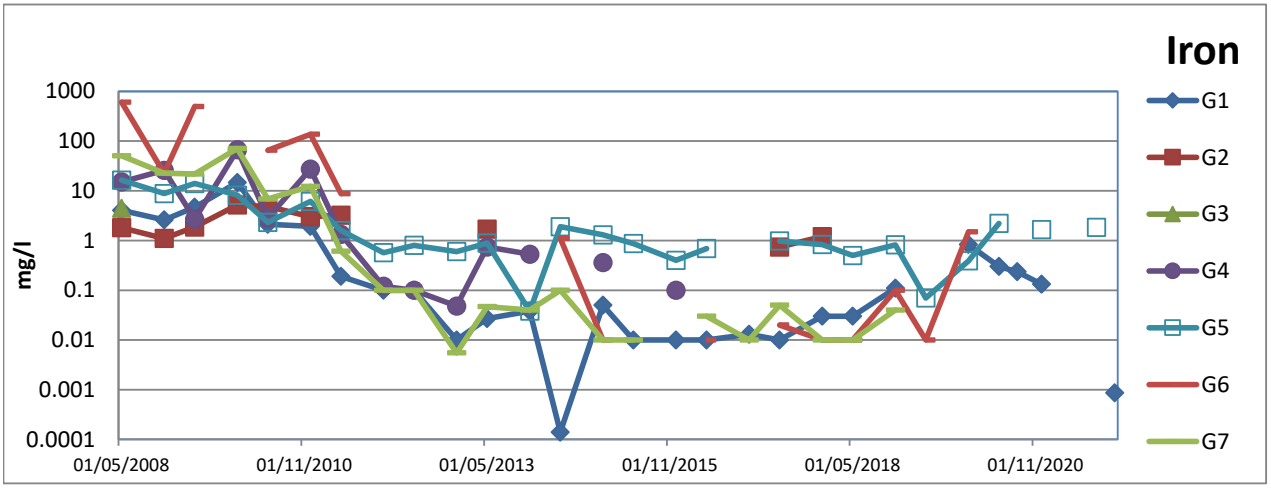

Ammonia
mg/l
18
16
14
12
10
8
6
4
2
0
01/05/2008
01/11/2010
01/05/2013
01/11/2015
01/05/2018
01/11/2020
G1
G2
G3
G4
G5
G6
G7

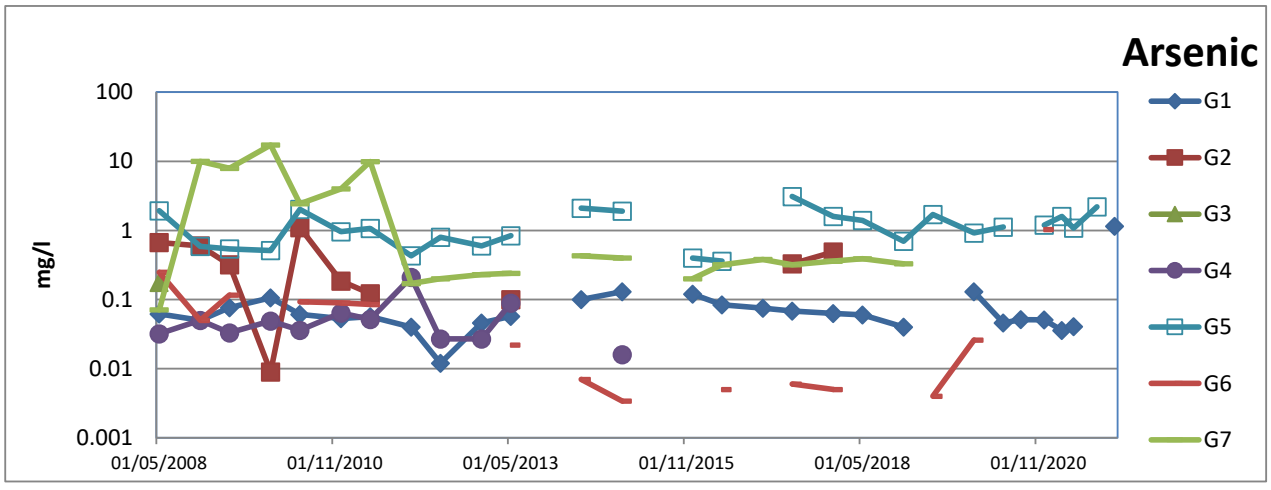

Nitrite
mg/l
1800
1600
1400
1200
1000
800
600
400
200
0
01/05/2008
01/11/2010
01/05/2013
01/11/2015
01/05/2018
01/11/2020
G1
G2
G3
G4
G5
G6
G7

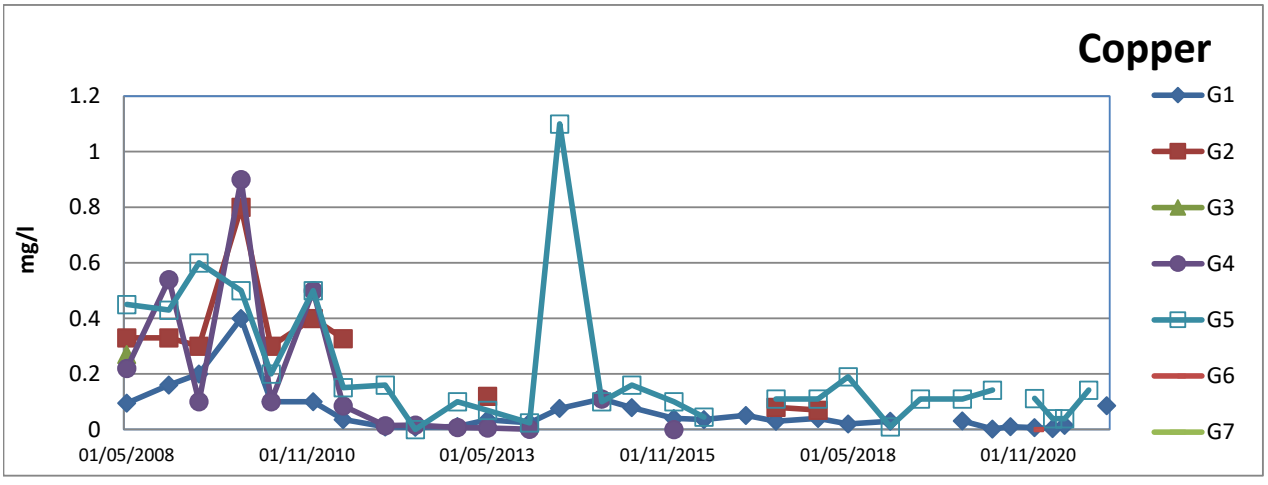

Sodium
mg/l
10000
1000
100
10
1
01/05/2008
01/11/2010
01/05/2013
01/11/2015
01/05/2018
01/11/2020
G1
G2
G3
G4
G5
G6
G7

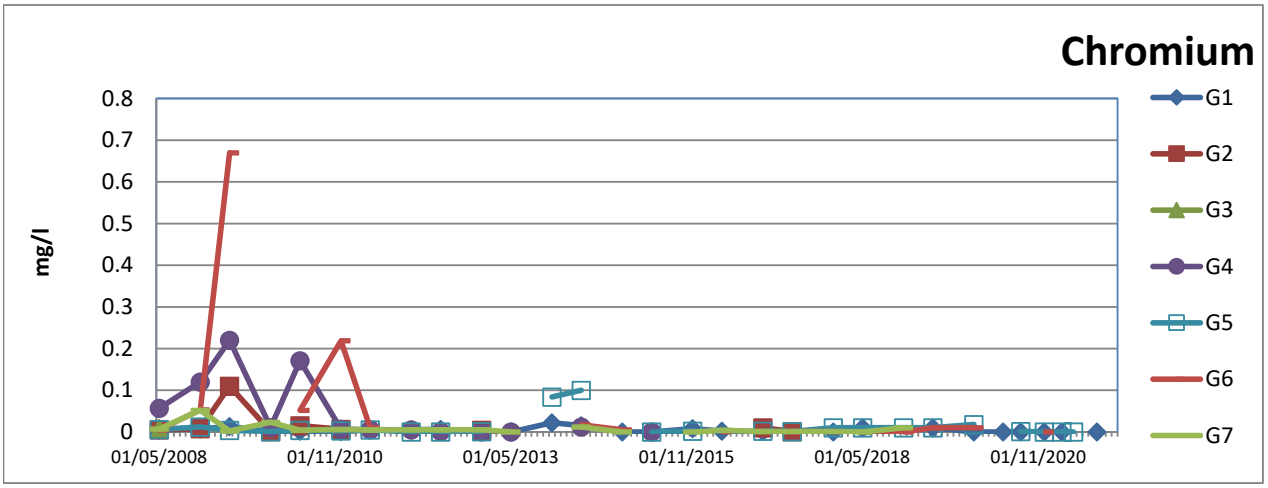

Boron
mg/l
5
4
3
2
1
0
01/05/2008
01/11/2010
01/05/2013
01/11/2015
01/05/2018
01/11/2020
G1
G2
G3
G4
G5
G6
G7

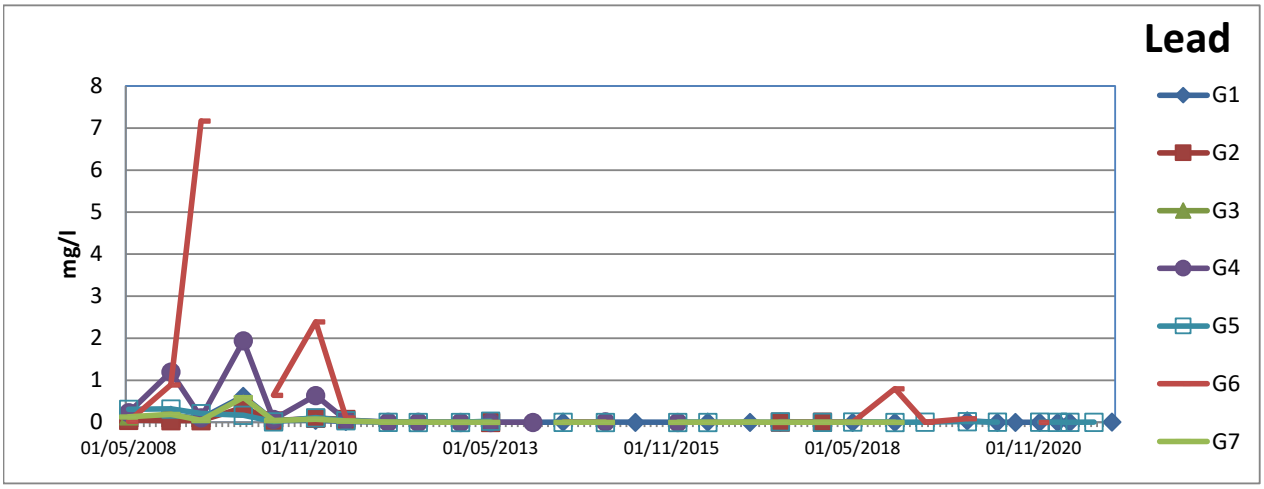

Tin
160
140
120
100
80
60
40
20
0
mg/l
01/05/2008
01/11/2010
01/05/2013
01/11/2015
01/05/2018
01/11/2020
G1
G2
G3
G4
G5
G6
G7

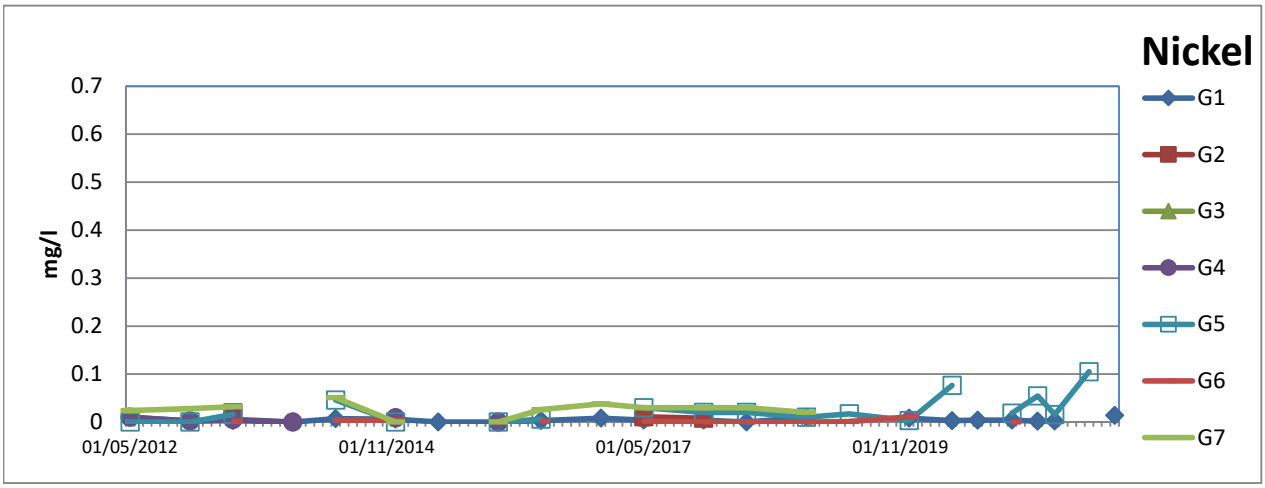

Iron
1000
100
10
1
0.1
0.01
0.001
0.0001
mg/l
01/05/2008
01/11/2010
01/05/2013
01/11/2015
01/05/2018
01/11/2020
G1
G2
G3
G4
G5
G6
G7

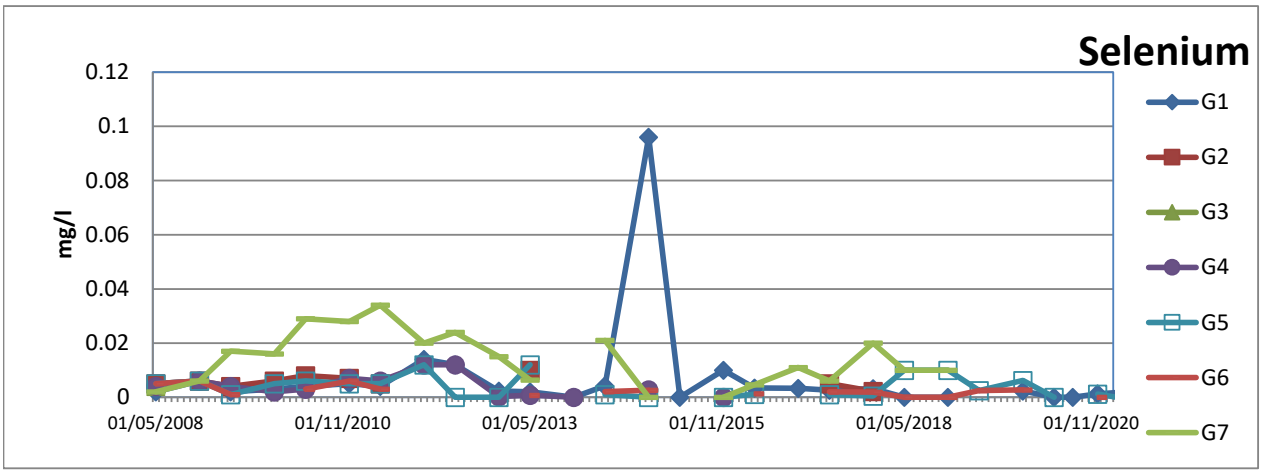

Arsenic
100
10
1
0.1
0.01
0.001
mg/l
01/05/2008
01/11/2010
01/05/2013
01/11/2015
01/05/2018
01/11/2020
G1
G2
G3
G4
G5
G6
G7

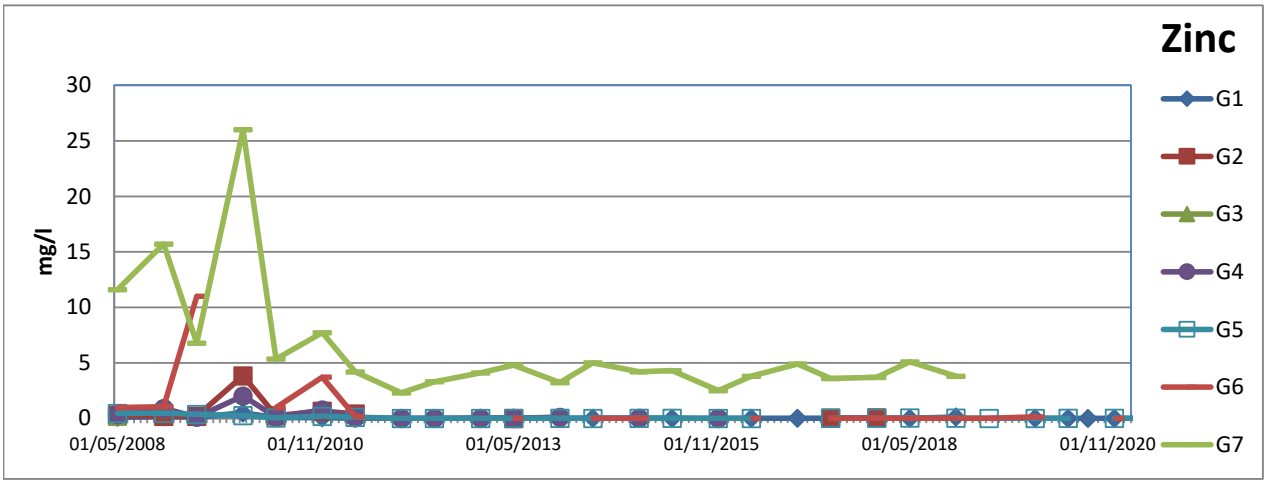

Copper
1.2
1
0.8
0.6
0.4
0.2
0
mg/l
01/05/2008
01/11/2010
01/05/2013
01/11/2015
01/05/2018
01/11/2020
G1
G2
G3
G4
G5
G6
G7

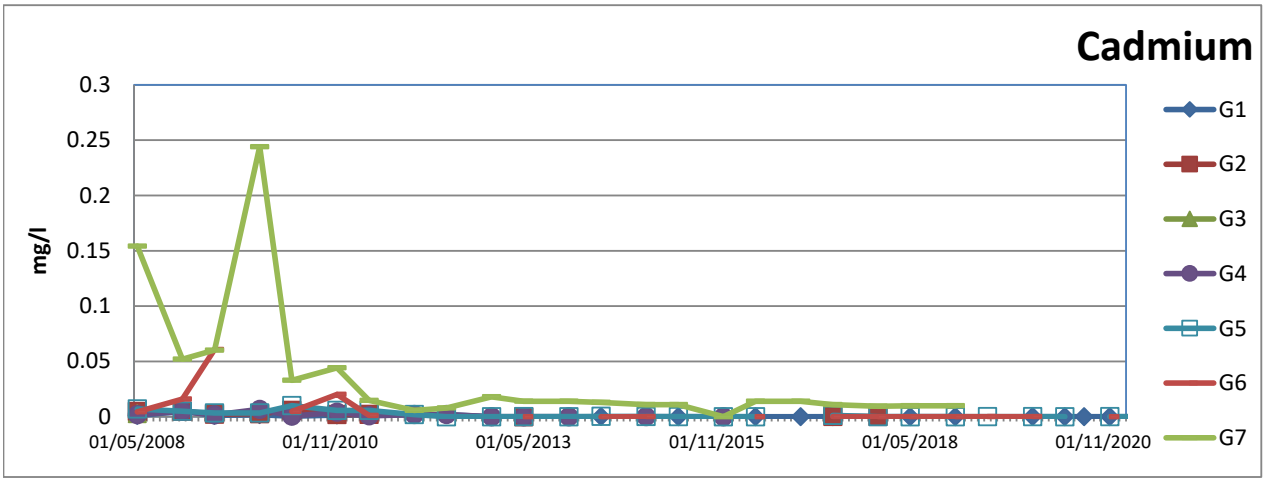

Chromium
mg/l
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
01/05/2008
01/11/2010
01/05/2013
01/11/2015
01/05/2018
01/11/2020
G1
G2
G3
G4
G5
G6
G7

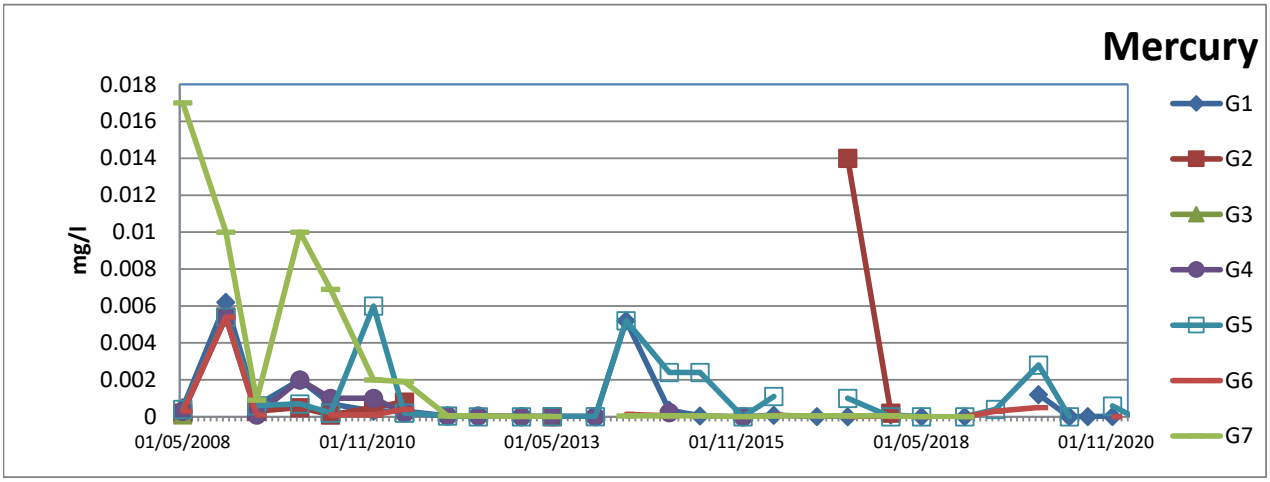

Lead
mg/l
8
7
6
5
4
3
2
1
0
01/05/2008
01/11/2010
01/05/2013
01/11/2015
01/05/2018
01/11/2020
G1
G2
G3
G4
G5
G6
G7

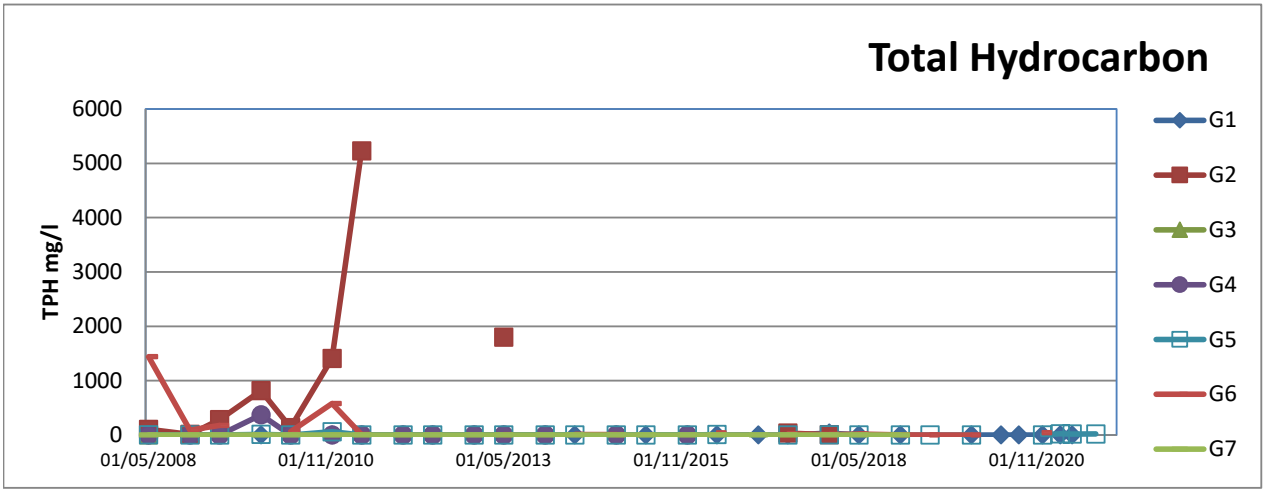

Nickel
mg/l
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
01/05/2012
01/11/2014
01/05/2017
01/11/2019
G1
G2
G3
G4
G5
G6
G7

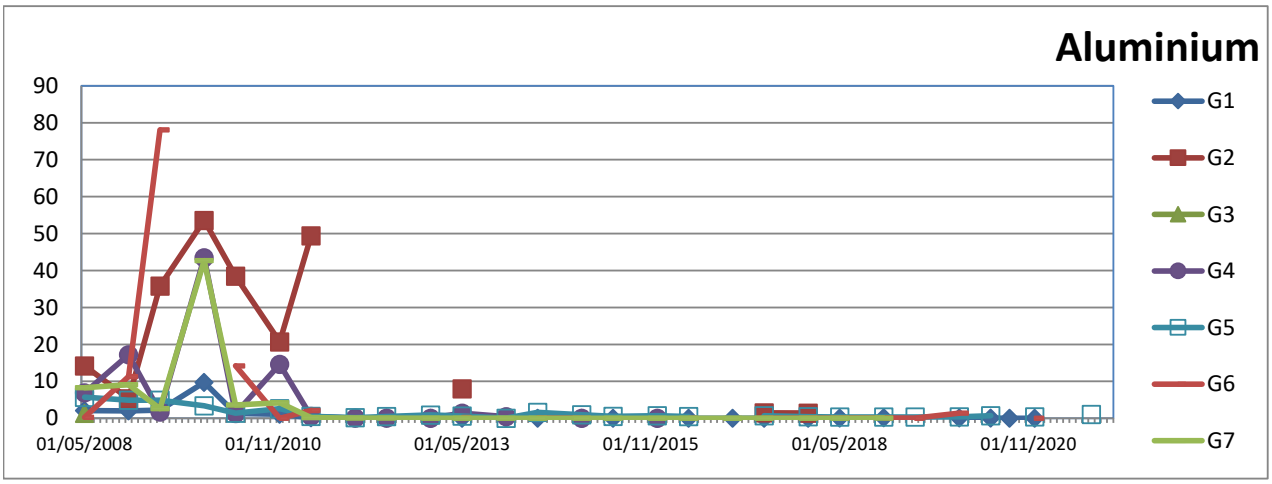

Selenium
mg/l
0.12
0.1
0.08
0.06
0.04
0.02
0
01/05/2008
01/11/2010
01/05/2013
01/11/2015
01/05/2018
01/11/2020
G1
G2
G3
G4
G5
G6
G7

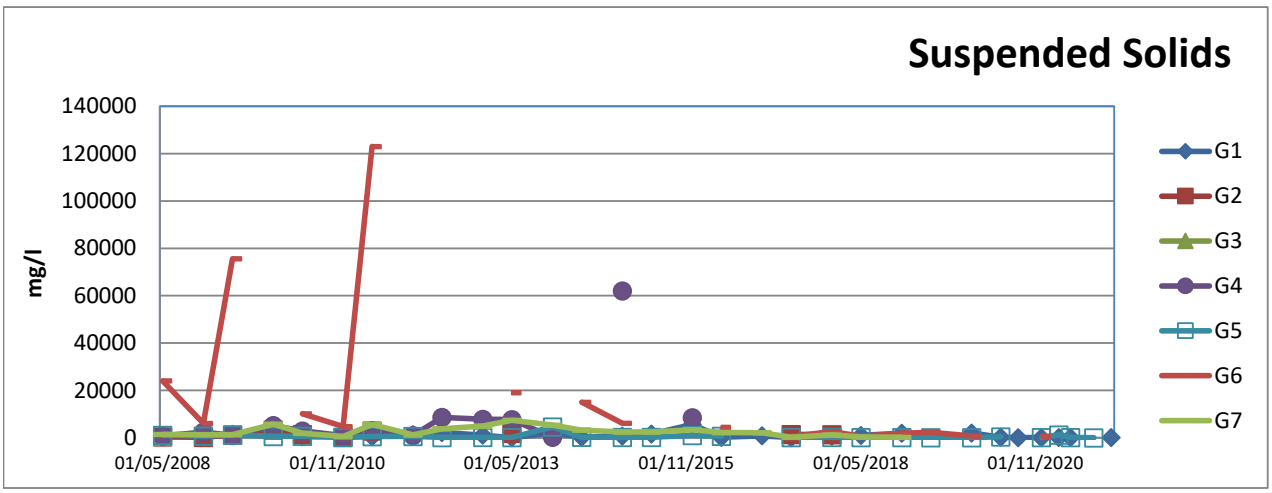

Zinc
mg/l
30
25
20
15
10
5
0
01/05/2008
01/11/2010
01/05/2013
01/11/2015
01/05/2018
01/11/2020
G1
G2
G3
G4
G5
G6
G7

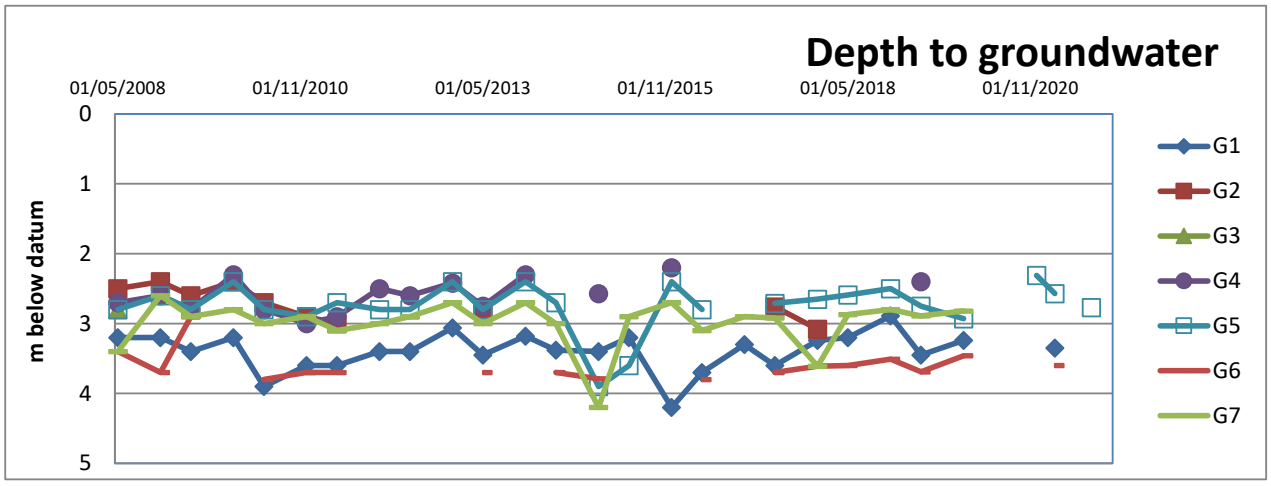

Cadmium
mg/l
0.3
0.25
0.2
0.15
0.1
0.05
0
01/05/2008
01/11/2010
01/05/2013
01/11/2015
01/05/2018
01/11/2020
G1
G2
G3
G4
G5
G6
G7


Mercury
mg/l
0.018
0.016
0.014
0.012
0.01
0.008
0.006
0.004
0.002
0
01/05/2008
01/11/2010
01/05/2013
01/11/2015
01/05/2018
01/11/2020
G1
G2
G3
G4
G5
G6
G7


Total Hydrocarbon
TPH mg/l
6000
5000
4000
3000
2000
1000
0
01/05/2008
01/11/2010
01/05/2013
01/11/2015
01/05/2018
01/11/2020
G1
G2
G3
G4
G5
G6
G7


Aluminium
90
80
70
60
50
40
30
20
10
0
01/05/2008
01/11/2010
01/05/2013
01/11/2015
01/05/2018
01/11/2020
G1
G2
G3
G4
G5
G6
G7


Suspended Solids
mg/l
140000
120000
100000
80000
60000
40000
20000
0
01/05/2008
01/11/2010
01/05/2013
01/11/2015
01/05/2018
01/11/2020
G1
G2
G3
G4
G5
G6
G7


Depth to groundwater
m below datum
01/05/2008
01/11/2010
01/05/2013
01/11/2015
01/05/2018
01/11/2020
0
1
2
3
4
5
G1
G2
G3
G4
G5
G6
G7

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Environmental Services

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