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Attention: John Fitzgerald

CERTIFICATE OF ANALYSIS

Date of report Generation: 03 February 2021
Customer: Atkins Global Ltd
Sample Delivery Group (SDG): 210127-33
Your Reference:
Location: Llanwern GAC
Report No: 585437

We received 8 samples on Wednesday January 27, 2021 and 8 of these samples were scheduled for analysis which was completed on Wednesday February 03, 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

Validated

SDG: 210127-33
Location: Llanwern GAC

Client Reference:
Order Number: 108282

Report Number: 585437
Superseded Report:

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
23613663	D5-C		0.00 - 0.00	26/01/2021
23613635	D3-S		0.00 - 0.00	26/01/2021
23613572	GAC Inlet		0.00 - 0.00	26/01/2021
23613587	GAC Outlet		0.00 - 0.00	26/01/2021
23613698	KW-C		0.00 - 0.00	26/01/2021
23613649	ML-N		0.00 - 0.00	26/01/2021
23613604	ML-S		0.00 - 0.00	26/01/2021
23613616	R3-C		0.00 - 0.00	26/01/2021

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



CERTIFICATE OF ANALYSIS

Validated

SDG: 210127-33 Client Reference: Report Number: 585437
Location: Llanwern GAC Order Number: 108282 Superseded Report: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)	Customer Sample Reference	AGS Reference	Depth (m)	Container												Sample Type
				250ml Amber Gl. PTFE/PE (ALE219)	1plastic (ALE221)	0.5l glass bottle (ALE227)	ZnAc (ALE246)	0.5l glass bottle (ALE227)	1plastic (ALE221)	250ml Amber Gl. PTFE/PE (ALE219)	H2SO4 (ALE244)	HNO3 Filtered (ALE204)	HNO3 Unfiltered (ALE204)	Vial (ALE297)	ZnAc (ALE246)	
2361363	D5-C		0.00 - 0.00	SW	SW	SW	SW	SW	SW	SW	SW	SW	SW	SW	SW	SW
23613635	D3-S		0.00 - 0.00	SW	SW	SW	SW	SW	SW	SW	SW	SW	SW	SW	SW	SW
23613672	GAC Inlet		0.00 - 0.00	SW	SW	SW	SW	SW	SW	SW	SW	SW	SW	SW	SW	SW
Sulphide			All	NDPs: 0 Tests: 8												
Suspended Solids			All	NDPs: 0 Tests: 8		X				X						X
Total Dissolved Solids			All	NDPs: 0 Tests: 8		X				X						X
Total Metals by ICP-MS			All	NDPs: 0 Tests: 8									X			
Total Organic and Inorganic Carbon			All	NDPs: 0 Tests: 8												
TPH CWG (W)			All	NDPs: 0 Tests: 8												
						X									X	

23613649	M/L-N		0.00 - 0.00	0.5l glass bottle (ALE227)	SW							X
23613698	KW-C		0.00 - 0.00	ZnAc (ALE246)	SW	X						
				Vial (ALE297)	SW							
				HNO3 Unfiltered (ALE204)	SW				X			
				HNO3 Filtered (ALE204)	SW							
				H2SO4 (ALE244)	SW					X		
				1plastic (ALE221)	SW							
				0.5l glass bottle (ALE227)	SW							X
23613587	GAC Outlet		0.00 - 0.00	ZnAc (ALE246)	SW	X						
				Vial (ALE297)	SW							
				HNO3 Unfiltered (ALE204)	SW				X			
				HNO3 Filtered (ALE204)	SW							
				H2SO4 (ALE244)	SW					X		
				250ml Amber Gl. PTFE/PE (ALE219)	SW							
				1plastic (ALE221)	SW		X		X			
				0.5l glass bottle (ALE227)	SW							X
23613572	GAC Inlet		0.00 - 0.00	ZnAc (ALE246)	SW	X						
				Vial (ALE297)	SW							
				HNO3 Unfiltered (ALE204)	SW				X			
				HNO3 Filtered (ALE204)	SW							X

23613616	R3-C		0.00 - 0.00	ZnAc (ALE246)	SW														
				ViaI (ALE297)	SW		X												
				HNO3 Unfiltered (ALE204)	SW								X						
				HNO3 Filtered (ALE204)	SW														



CERTIFICATE OF ANALYSIS

Validated

SDG: 210127-33
Location: Llanwern GACClient Reference:
Order Number: 108282Report Number: 585437
Superseded Report:

Results Legend			Customer Sample Ref.		D5-C	D3-S	GAC Inlet	GAC Outlet	KW-C	ML-N
#	ISO17025 accredited.		Depth (m) Sample Type Date Sampled Sample Time Date Received SDG Ref Lab Sample No.(s) AGS Reference		0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00
M	mCERTS accredited.				Surface Water (SW)	Surface Water (SW)	Surface Water (SW)	Surface Water (SW)	Surface Water (SW)	Surface Water (SW)
aq	Aqueous / settled sample.				26/01/2021	26/01/2021	26/01/2021	26/01/2021	26/01/2021	26/01/2021
diss.filt	Dissolved / filtered sample.				00:00	00:00	00:00	00:00	00:00	00:00
tot.unfilt	Total / unfiltered sample.				27/01/2021	27/01/2021	27/01/2021	27/01/2021	27/01/2021	27/01/2021
Subcontracted - refer to subcontractor report for accreditation status.					210127-33	210127-33	210127-33	210127-33	210127-33	210127-33
% 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					23613663	23613635	23613572	23613587	23613698	23613649
(F) Trigger breach confirmed										
1-4*5@ Sample deviation (see appendix)										
Component	LOD/Units	Method								
Suspended solids, Total	<2 mg/l	TM022			24.8	6.25	2.65	8.8	21	14.3
					#	#	#	#	#	#
BOD, unfiltered	<1 mg/l	TM045			2.01	<1	<1	<1	<1	<1
					#	#	#	#	#	#
Oxygen, dissolved	<0.3 mg/l	TM046			9.63	9.87	10.3	10.5	8.5	9.39
Carbon, Organic (diss.filt)	<3 mg/l	TM090			6.41	7.15	6.47	5.68	6.66	6.19
Organic Carbon, Total	<3 mg/l	TM090			5.66	5.86	5.91	6.17	6.32	6.07
					#	#	#	#	#	#
Ammoniacal Nitrogen as NH4	<0.3 mg/l	TM099			1.2	0.366	4.53	3.56	1.24	1.57
					#	#	#	#	#	#
Sulphide	<0.01 mg/l	TM101			0.032	<0.01	<0.01	0.0154	<0.01	<0.01
COD, unfiltered	<7 mg/l	TM107			19.5	26.1	13.5	21	26.9	22.1
					#	#	#	#	#	#
Redox potential	mV	TM110			139	149	66	99	72	152
Conductivity @ 20 deg.C (diss.filt)	<0.02 mS/cm	TM120			0.615	0.486	0.594	0.567	0.412	0.442
Dissolved solids, Total (meter)	<5 mg/l	TM123			479	388	431	444	325	349
					#	#	#	#	#	#
Arsenic (diss.filt)	<0.5 µg/l	TM152			2.06	2.55	6.58	5.34	1.85	1.72
					#	#	#	#	#	#
Arsenic (tot.unfilt)	<2 µg/l	TM152			2.59	2.53	6.7	5.31	2.12	<2
					#	#	#	#	#	#
Cadmium (diss.filt)	<0.08 µg/l	TM152			<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
					#	#	#	#	#	#
Cadmium (tot.unfilt)	<0.5 µg/l	TM152			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
					#	#	#	#	#	#
Chromium (tot.unfilt)	<3 µg/l	TM152			3.21	<3	<3	<3	<3	<3
					#	#	#	#	#	#
Chromium (diss.filt)	<1 µg/l	TM152			1.94	1.29	<1	<1	<1	<1
					#	#	#	#	#	#
Copper (tot.unfilt)	<1 µg/l	TM152			6.52	4.03	2.38	9.96	2.84	2.31
					#	#	#	#	#	#
Lead (tot.unfilt)	<1 µg/l	TM152			5.22	1.01	<1	<1	<1	<1
					#	#	#	#	#	#
Copper (diss.filt)	<0.3 µg/l	TM152			4.1	3.73	2.73	7.2	2.41	1.68
					#	#	#	#	#	#
Lead (diss.filt)	<0.2 µg/l	TM152			<0.2	<0.2	0.461	<0.2	<0.2	<0.2
					#	#	#	#	#	#
Nickel (tot.unfilt)	<1 µg/l	TM152			2.1	1.59	2.59	2.68	2.41	2.16
					#	#	#	#	#	#
Selenium (tot.unfilt)	<1 µg/l	TM152			1.9	1.72	4.33	3.49	1.53	1.57
					#	#	#	#	#	#
Nickel (diss.filt)	<0.4 µg/l	TM152			1.42	1.51	2.97	1.99	2.03	1.9
					#	#	#	#	#	#
Selenium (diss.filt)	<1 µg/l	TM152			1.7	1.28	4.06	3.42	1.26	1.41
					#	#	#	#	#	#
Vanadium (tot.unfilt)	<5 µg/l	TM152			30.1	20.8	75.2	54.2	14.2	10.6
					#	#	#	#	#	#
Zinc (tot.unfilt)	<5 µg/l	TM152			18.6	5.86	<5	5.92	<5	<5
					#	#	#	#	#	#
Vanadium (diss.filt)	<1 µg/l	TM152			27.3	21.2	73.4	51.6	12.9	10.1
					#	#	#	#	#	#
Zinc (diss.filt)	<1 µg/l	TM152			<1	<1	1.24	<1	<1	<1
					#	#	#	#	#	#
Iron (Dis.Filt)	<0.019 mg/l	TM152			<0.019	<0.019	0.038	0.0217	<0.019	<0.019
					#	#	#	#	#	#
Iron (Tot. Unfilt.)	<0.024 mg/l	TM152			0.7	0.359	0.0808	0.153	0.332	0.187
					#	#	#	#	#	#
Naphthalene (diss.filt)	<0.01 µg/l	TM178			0.0977	0.0168	0.869	0.0961	0.0484	0.158
Acenaphthene (diss.filt)	<0.005 µg/l	TM178			0.141	0.00833	0.127	0.0279	0.0522	0.0777



CERTIFICATE OF ANALYSIS

Validated

SDG: 210127-33 **Client Reference:** **Report Number:** 585437
Location: Llanwern GAC **Order Number:** 108282 **Superseded Report:**

Results Legend			Customer Sample Ref.		ML-S	R3-C				
#	ISO17025 accredited.		Depth (m) Sample Type Date Sampled Sample Time Date Received SDG Ref Lab Sample No.(s) AGS Reference		0.00 - 0.00	0.00 - 0.00				
M	mCERTS accredited.				Surface Water (SW)	Surface Water (SW)				
aq	Aqueous / settled sample.				26/01/2021	26/01/2021				
diss.filt	Dissolved / filtered sample.				00:00	00:00				
tot.unfilt	Total / unfiltered sample.				27/01/2021	27/01/2021				
*	Subcontracted - refer to subcontractor report for accreditation status.				210127-33	210127-33				
**	% 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				23613604	23613616				
(F)	Trigger breach confirmed									
1-4*5@	Sample deviation (see appendix)									
Component	LOD/Units	Method								
Suspended solids, Total	<2 mg/l	TM022			19.3	7.85				
					#	#				
BOD, unfiltered	<1 mg/l	TM045			2.01	<1				
					#	#				
Oxygen, dissolved	<0.3 mg/l	TM046			9.91	9.37				
Carbon, Organic (diss.filt)	<3 mg/l	TM090			6.14	6.8				
Organic Carbon, Total	<3 mg/l	TM090			5.78	5.76				
					#	#				
Ammoniacal Nitrogen as NH4	<0.3 mg/l	TM099			1.32	0.604				
					#	#				
Sulphide	<0.01 mg/l	TM101			<0.01	<0.01				
COD, unfiltered	<7 mg/l	TM107			<7	30.8				
					#	#				
Redox potential	mV	TM110			147	85				
Conductivity @ 20 deg.C (diss.filt)	<0.02 mS/cm	TM120			0.462	0.549				
Dissolved solids, Total (meter)	<5 mg/l	TM123			354	432				
					#	#				
Arsenic (diss.filt)	<0.5 µg/l	TM152			1.7	1.83				
					#	#				
Arsenic (tot.unfilt)	<2 µg/l	TM152			<2	2.07				
					#	#				
Cadmium (diss.filt)	<0.08 µg/l	TM152			<0.08	<0.08				
					#	#				
Cadmium (tot.unfilt)	<0.5 µg/l	TM152			<0.5	<0.5				
					#	#				
Chromium (tot.unfilt)	<3 µg/l	TM152			<3	<3				
					#	#				
Chromium (diss.filt)	<1 µg/l	TM152			<1	<1				
					#	#				
Copper (tot.unfilt)	<1 µg/l	TM152			2.36	3.8				
					#	#				
Lead (tot.unfilt)	<1 µg/l	TM152			<1	<1				
					#	#				
Copper (diss.filt)	<0.3 µg/l	TM152			1.96	2.95				
					#	#				
Lead (diss.filt)	<0.2 µg/l	TM152			<0.2	<0.2				
					#	#				
Nickel (tot.unfilt)	<1 µg/l	TM152			2	1.56				
					#	#				
Selenium (tot.unfilt)	<1 µg/l	TM152			1.44	1.71				
					#	#				
Nickel (diss.filt)	<0.4 µg/l	TM152			1.78	1.38				
					#	#				
Selenium (diss.filt)	<1 µg/l	TM152			1.19	1.63				
					#	#				
Vanadium (tot.unfilt)	<5 µg/l	TM152			9.8	15.2				
					#	#				
Zinc (tot.unfilt)	<5 µg/l	TM152			<5	<5				
					#	#				
Vanadium (diss.filt)	<1 µg/l	TM152			9.23	13.9				
					#	#				
Zinc (diss.filt)	<1 µg/l	TM152			<1	<1				
					#	#				
Iron (Dis.Filt)	<0.019 mg/l	TM152			<0.019	0.022				
					#	#				
Iron (Tot. Unfilt.)	<0.024 mg/l	TM152			0.199	0.406				
					#	#				
Naphthalene (diss.filt)	<0.01 µg/l	TM178			0.23	0.0852				
Acenaphthene (diss.filt)	<0.005 µg/l	TM178			0.0862	0.0289				



CERTIFICATE OF ANALYSIS

Validated

SDG: 210127-33
Location: Llanwern GACClient Reference:
Order Number: 108282Report Number: 585437
Superseded Report:

TPH CWG (W)

Results Legend			Customer Sample Ref.		D5-C	D3-S	GAC Inlet	GAC Outlet	KW-C	ML-N
#	ISO17025 accredited.		Depth (m) Sample Type Date Sampled Sample Time Date Received SDG Ref Lab Sample No.(s) AGS Reference		0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00
M	mCERTS accredited.				Surface Water (SW)	Surface Water (SW)	Surface Water (SW)	Surface Water (SW)	Surface Water (SW)	Surface Water (SW)
aq	Aqueous / settled sample.				26/01/2021	26/01/2021	26/01/2021	26/01/2021	26/01/2021	26/01/2021
diss.filt	Dissolved / filtered sample.				00:00	00:00	00:00	00:00	00:00	00:00
tot.unfilt	Total / unfiltered sample.				27/01/2021	27/01/2021	27/01/2021	27/01/2021	27/01/2021	27/01/2021
*	Subcontracted - refer to subcontractor report for accreditation status.				210127-33	210127-33	210127-33	210127-33	210127-33	210127-33
**	% 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				23613663	23613635	23613572	23613587	23613698	23613649
(F)	Trigger breach confirmed									
1-4*5@	Sample deviation (see appendix)									
Component	LOD/Units	Method								
GRO Surrogate % recovery**	%	TM245			116	114	113	113	116	121
GRO >C5-C12	<50 µg/l	TM245			<50	<50	<50	<50	<50	<50
					#	#	#	#	#	#
Methyl tertiary butyl ether (MTBE)	<3 µg/l	TM245			<3	<3	<3	<3	<3	<3
					#	#	#	#	#	#
Benzene	<7 µg/l	TM245			<7	<7	<7	<7	<7	<7
					#	#	#	#	#	#
Toluene	<4 µg/l	TM245			<4	<4	<4	<4	<4	<4
					#	#	#	#	#	#
Ethylbenzene	<5 µg/l	TM245			<5	<5	<5	<5	<5	<5
					#	#	#	#	#	#
m,p-Xylene	<8 µg/l	TM245			<8	<8	<8	<8	<8	<8
					#	#	#	#	#	#
o-Xylene	<3 µg/l	TM245			<3	<3	<3	<3	<3	<3
					#	#	#	#	#	#
Sum of detected Xylenes	<11 µg/l	TM245			<11	<11	<11	<11	<11	<11
Sum of detected BTEX	<28 µg/l	TM245			<28	<28	<28	<28	<28	<28
Aliphatics >C5-C6	<10 µg/l	TM245			<10	<10	<10	<10	<10	<10
Aliphatics >C6-C8	<10 µg/l	TM245			<10	<10	<10	<10	<10	<10
Aliphatics >C8-C10	<10 µg/l	TM245			<10	<10	<10	<10	<10	<10
Aliphatics >C10-C12	<10 µg/l	TM245			<10	<10	<10	<10	<10	<10
Aliphatics >C12-C16 (aq)	<10 µg/l	TM174			<10	<10	<10	<10	<10	<10
Aliphatics >C16-C21 (aq)	<10 µg/l	TM174			<10	<10	<10	<10	<10	<10
Aliphatics >C21-C35 (aq)	<10 µg/l	TM174			<10	<10	<10	<10	<10	<10
Total Aliphatics >C12-C35 (aq)	<10 µg/l	TM174			<10	<10	<10	<10	<10	<10
Aromatics >EC5-EC7	<10 µg/l	TM245			<10	<10	<10	<10	<10	<10
Aromatics >EC7-EC8	<10 µg/l	TM245			<10	<10	<10	<10	<10	<10
Aromatics >EC8-EC10	<10 µg/l	TM245			<10	<10	<10	<10	<10	<10
Aromatics >EC10-EC12	<10 µg/l	TM245			<10	<10	<10	<10	<10	<10
Aromatics >EC12-EC16 (aq)	<10 µg/l	TM174			<10	<10	<10	<10	<10	<10
Aromatics >EC16-EC21 (aq)	<10 µg/l	TM174			<10	<10	<10	<10	<10	<10
Aromatics >EC21-EC35 (aq)	<10 µg/l	TM174			<10	<10	<10	<10	<10	<10
Total Aromatics >EC12-EC35 (aq)	<10 µg/l	TM174			<10	<10	<10	<10	<10	<10
Total Aliphatics & Aromatics >C5-35 (aq)	<10 µg/l	TM174			<10	<10	<10	<10	<10	<10
Aliphatics >C16-C35 Aqueous	<10 µg/l	TM174			<10	<10	<10	<10	<10	<10



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SDG: 210127-33
Location: Llanwern GACClient Reference:
Order Number: 108282Report Number: 585437
Superseded Report:

TPH CWG (W)

Results Legend			Customer Sample Ref.		ML-S	R3-C				
#	ISO17025 accredited.		Depth (m) Sample Type Date Sampled Sample Time Date Received SDG Ref Lab Sample No.(s) AGS Reference		0.00 - 0.00	0.00 - 0.00				
M	mCERTS accredited.				Surface Water (SW)	Surface Water (SW)				
aq	Aqueous / settled sample.				26/01/2021	26/01/2021				
diss.filt	Dissolved / filtered sample.				00:00	00:00				
tot.unfilt	Total / unfiltered sample.				27/01/2021	27/01/2021				
*	Subcontracted - refer to subcontractor report for accreditation status.				210127-33	210127-33				
**	% 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				23613604	23613616				
(F)	Trigger breach confirmed									
1-4*5@	Sample deviation (see appendix)									
Component	LOD/Units	Method								
GRO Surrogate % recovery**	%	TM245			117	116				
GRO >C5-C12	<50 µg/l	TM245			<50	<50				
					#	#				
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 Xylenes	<11 µg/l	TM245			<11	<11				
Sum of detected BTEX	<28 µg/l	TM245			<28	<28				
Aliphatics >C5-C6	<10 µg/l	TM245			<10	<10				
Aliphatics >C6-C8	<10 µg/l	TM245			<10	<10				
Aliphatics >C8-C10	<10 µg/l	TM245			<10	<10				
Aliphatics >C10-C12	<10 µg/l	TM245			<10	<10				
Aliphatics >C12-C16 (aq)	<10 µg/l	TM174			<10	<10				
Aliphatics >C16-C21 (aq)	<10 µg/l	TM174			<10	<10				
Aliphatics >C21-C35 (aq)	<10 µg/l	TM174			<10	<10				
Total Aliphatics >C12-C35 (aq)	<10 µg/l	TM174			<10	<10				
Aromatics >EC5-EC7	<10 µg/l	TM245			<10	<10				
Aromatics >EC7-EC8	<10 µg/l	TM245			<10	<10				
Aromatics >EC8-EC10	<10 µg/l	TM245			<10	<10				
Aromatics >EC10-EC12	<10 µg/l	TM245			<10	<10				
Aromatics >EC12-EC16 (aq)	<10 µg/l	TM174			<10	<10				
Aromatics >EC16-EC21 (aq)	<10 µg/l	TM174			<10	<10				
Aromatics >EC21-EC35 (aq)	<10 µg/l	TM174			<10	<10				
Total Aromatics >EC12-EC35 (aq)	<10 µg/l	TM174			<10	<10				
Total Aliphatics & Aromatics >C5-35 (aq)	<10 µg/l	TM174			<10	<10				
Aliphatics >C16-C35 Aqueous	<10 µg/l	TM174			<10	<10				



CERTIFICATE OF ANALYSIS

SDG:	210127-33	Client Reference:		Report Number:	585437
Location:	Llanwern GAC	Order Number:	108282	Superseded Report:	

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
TM045	MEWAM BOD5 2nd Ed.HMSO 1988 / Method 5210B, AWWA/APHA, 20th Ed., 1999; SCA Blue Book 130	Determination of BOD5 (ATU) Filtered by Oxygen Meter on liquids
TM046	Method 4500G, AWWA/APHA, 20th Ed., 1999	Measurement of Dissolved Oxygen by Oxygen Meter
TM090	Method 5310, AWWA/APHA, 20th Ed., 1999 / Modified: US EPA Method 415.1 & 9060	Determination of Total Organic Carbon/Total Inorganic Carbon in Water and Waste Water
TM099	BS 2690: Part 7:1968 / BS 6068: Part2.11:1984	Determination of Ammonium in Water Samples using the Kone Analyser
TM101	Method 4500B & C, AWWA/APHA, 20th Ed., 1999	Determination of Sulphide in soil and water samples using the Kone Analyser
TM107	ISO 6060-1989	Determination of Chemical Oxygen Demand using COD Dr Lange Kit
TM110	BS 1377: Part 3 1990	Redox Potential
TM120	Method 2510B, AWWA/APHA, 20th Ed., 1999 / BS 2690: Part 9:1970	Determination of Electrical Conductivity using a Conductivity Meter
TM123	BS 2690: Part 121:1981	The Determination of Total Dissolved Solids in Water
TM152	Method 3125B, AWWA/APHA, 20th Ed., 1999	Analysis of Aqueous Samples by ICP-MS
TM174	Analysis of Petroleum Hydrocarbons in Environmental Media – Total Petroleum Hydrocarbon Criteria	Determination of Speciated Extractable Petroleum Hydrocarbons in Waters by GC-FID
TM178	Modified: US EPA Method 8100	Determination of Polynuclear Aromatic Hydrocarbons (PAH) by GC-MS 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
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: 210127-33
Location: Llanwern GACClient Reference:
Order Number: 108282Report Number: 585437
Superseded Report:

Test Completion Dates

Lab Sample No(s)	23613663	23613635	23613572	23613587	23613698	23613649	23613604	23613616
Customer Sample Ref.	D5-C	D3-S	GAC Inlet	GAC Outlet	KW-C	ML-N	ML-S	R3-C
AGS Ref.								
Depth	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00
Type	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water
Ammoniacal Nitrogen	28-Jan-2021	28-Jan-2021	28-Jan-2021	28-Jan-2021	28-Jan-2021	28-Jan-2021	28-Jan-2021	28-Jan-2021
BOD True Total	03-Feb-2021	03-Feb-2021	03-Feb-2021	03-Feb-2021	03-Feb-2021	03-Feb-2021	03-Feb-2021	03-Feb-2021
COD Unfiltered	31-Jan-2021	01-Feb-2021	31-Jan-2021	31-Jan-2021	01-Feb-2021	01-Feb-2021	31-Jan-2021	01-Feb-2021
Conductivity (at 20 deg.C)	28-Jan-2021	28-Jan-2021	28-Jan-2021	28-Jan-2021	28-Jan-2021	28-Jan-2021	28-Jan-2021	28-Jan-2021
Dissolved Metals by ICP-MS	29-Jan-2021	29-Jan-2021	29-Jan-2021	29-Jan-2021	29-Jan-2021	29-Jan-2021	29-Jan-2021	29-Jan-2021
Dissolved Organic/Inorganic Carbon	29-Jan-2021	29-Jan-2021	29-Jan-2021	29-Jan-2021	29-Jan-2021	29-Jan-2021	29-Jan-2021	29-Jan-2021
Dissolved Oxygen by Probe	29-Jan-2021	29-Jan-2021	29-Jan-2021	29-Jan-2021	29-Jan-2021	29-Jan-2021	29-Jan-2021	29-Jan-2021
EPH CWG (Aliphatic) Aqueous GC (W)	29-Jan-2021	29-Jan-2021	29-Jan-2021	29-Jan-2021	29-Jan-2021	29-Jan-2021	29-Jan-2021	29-Jan-2021
EPH CWG (Aromatic) Aqueous GC (W)	29-Jan-2021	29-Jan-2021	29-Jan-2021	29-Jan-2021	29-Jan-2021	29-Jan-2021	29-Jan-2021	29-Jan-2021
GRO by GC-FID (W)	01-Feb-2021	01-Feb-2021	01-Feb-2021	01-Feb-2021	01-Feb-2021	01-Feb-2021	01-Feb-2021	02-Feb-2021
Mercury Dissolved	29-Jan-2021	28-Jan-2021	28-Jan-2021	28-Jan-2021	29-Jan-2021	28-Jan-2021	28-Jan-2021	28-Jan-2021
Mercury Unfiltered	29-Jan-2021	29-Jan-2021	29-Jan-2021	29-Jan-2021	29-Jan-2021	29-Jan-2021	29-Jan-2021	29-Jan-2021
PAH in waters by GC-MS (diss.filt)	01-Feb-2021	01-Feb-2021	28-Jan-2021	28-Jan-2021	28-Jan-2021	28-Jan-2021	28-Jan-2021	01-Feb-2021
pH Value	02-Feb-2021	02-Feb-2021	02-Feb-2021	02-Feb-2021	02-Feb-2021	02-Feb-2021	02-Feb-2021	02-Feb-2021
Redox Potential	27-Jan-2021	27-Jan-2021	27-Jan-2021	27-Jan-2021	27-Jan-2021	27-Jan-2021	27-Jan-2021	27-Jan-2021
Sulphide	28-Jan-2021	28-Jan-2021	28-Jan-2021	28-Jan-2021	28-Jan-2021	28-Jan-2021	28-Jan-2021	28-Jan-2021
Suspended Solids	28-Jan-2021	28-Jan-2021	28-Jan-2021	28-Jan-2021	28-Jan-2021	28-Jan-2021	28-Jan-2021	28-Jan-2021
Total Dissolved Solids	27-Jan-2021	27-Jan-2021	27-Jan-2021	27-Jan-2021	29-Jan-2021	27-Jan-2021	27-Jan-2021	27-Jan-2021
Total Metals by ICP-MS	29-Jan-2021	29-Jan-2021	29-Jan-2021	29-Jan-2021	29-Jan-2021	29-Jan-2021	29-Jan-2021	29-Jan-2021
Total Organic and Inorganic Carbon	28-Jan-2021	28-Jan-2021	29-Jan-2021	28-Jan-2021	28-Jan-2021	28-Jan-2021	28-Jan-2021	29-Jan-2021
TPH CWG (W)	01-Feb-2021	01-Feb-2021	01-Feb-2021	01-Feb-2021	01-Feb-2021	01-Feb-2021	01-Feb-2021	02-Feb-2021



CERTIFICATE OF ANALYSIS

SDG:	210127-33	Client Reference:		Report Number:	585437
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Appendix

1. Results are expressed on a dry weight basis (dried at 35°C) 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.

General

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.