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Attention: Sven Klinkenbergh

CERTIFICATE OF ANALYSIS

Date of report Generation: 20 August 2020
Customer: Minerex Environmental
Sample Delivery Group (SDG): 200814-71
Your Reference: 3188-A2-COC1
Location: Inchamore, Co. Cork
Report No: 564014

We received 4 samples on Friday August 14, 2020 and 4 of these samples were scheduled for analysis which was completed on Thursday August 20, 2020. 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: 200814-71	Client Reference: 3188-A2-COC1	Report Number: 564014
Location: Inchamore, Co. Cork	Order Number:	Superseded Report:

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
22656606	3188-SW1		0.00 - 0.00	12/08/2020
22656623	3188-SW2		0.00 - 0.00	12/08/2020
22656636	3188-SW3		0.00 - 0.00	12/08/2020
22656649	3188-SW4		0.00 - 0.00	12/08/2020

Maximum Sample/Coolbox Temperature (°C) :

17.4

ISO5667-3 Water quality - Sampling - Part3 -

During Transportation samples shall be stored in a cooling device capable of maintaining a temperature of (5±3)°C.

ALS have data which show that a cool box with 4 frozen icepacks is capable of maintaining pre-chilled samples at a temperature of (5±3)°C for a period of up to 24hrs.

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



CERTIFICATE OF ANALYSIS

Validated

SDG: 200814-71 Client Reference: 3188-A2-COC1 Report Number: 564014
 Location: Inchamore, Co. Cork Order Number: Superseded Report: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

Results Legend	Lab Sample No(s)		22656606		22656623		22656636		22656649				
	Customer Sample Reference		3188-SW1		3188-SW2		3188-SW3		3188-SW4				
AGS Reference													
Depth (m)		0.00 - 0.00		0.00 - 0.00		0.00 - 0.00		0.00 - 0.00					
Container		500ml Plastic (ALE208)	H2SO4 (ALE244)	HNO3 Unfiltered (ALE204)	NaOH (ALE245)	500ml Plastic (ALE208)	H2SO4 (ALE244)	HNO3 Unfiltered (ALE204)	NaOH (ALE245)	500ml Plastic (ALE208)	H2SO4 (ALE244)	HNO3 Unfiltered (ALE204)	NaOH (ALE245)
Sample Type		SW	SW	SW	SW	SW	SW	SW	SW	SW	SW	SW	SW
Alkalinity as CaCO3	All	NDPs: 0 Tests: 4	X		X		X		X				
Ammonium Low	All	NDPs: 0 Tests: 4		X		X		X			X		
Anions by Kone (w)	All	NDPs: 0 Tests: 4	X		X		X		X				
Colour Test	All	NDPs: 0 Tests: 4	X		X		X		X				
Conductivity (at 20 deg.C)	All	NDPs: 0 Tests: 4	X		X		X		X				
Nitrite by Kone (w)	All	NDPs: 0 Tests: 4			X		X		X				X
pH Value	All	NDPs: 0 Tests: 4	X		X		X		X				
Phosphate by Kone (w)	All	NDPs: 0 Tests: 4	X		X		X		X				
Suspended Solids	All	NDPs: 0 Tests: 4	X		X		X		X				
Total Metals by ICP-MS	All	NDPs: 0 Tests: 4		X		X		X				X	
Turbidity in waters	All	NDPs: 0 Tests: 4	X		X		X		X				



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SDG: 200814-71
Location: Inchamore, Co. Cork

Client Reference: 3188-A2-COC1
Order Number:

Report Number: 564014
Superseded Report:

Table with columns: Results Legend, Customer Sample Ref., 3188-SW1, 3188-SW2, 3188-SW3, 3188-SW4, Component, LOD/Units, Method, and numerical data for various parameters like Suspended solids, Alkalinity, Ammoniacal Nitrogen, etc.



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SDG: 200814-71 **Client Reference:** 3188-A2-COC1 **Report Number:** 564014
Location: Inchamore, Co. Cork **Order Number:** **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
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	Method 3125B, AWWA/APHA, 20th Ed., 1999	Analysis of Aqueous Samples by ICP-MS
TM184	EPA Methods 325.1 & 325.2,	The Determination of Anions in Aqueous Matrices using the Kone Spectrophotometric Analysers
TM195	Colour and Turbidity of water. Methods for the Examination of Waters and Associated Materials. HMSO, 1981, ISBN 0 11 751955 3.	Determination of Turbidity in Waters & Associated Matrices
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
TM261	Colour and Turbidity of Waters, Methods for the Examination of Waters and Associated Materials, HMSO, 1981, ISBN 0 11 7519553.	Determination of True and Apparent Colour by Spectrophotometry

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).



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SDG: 200814-71	Client Reference: 3188-A2-COC1	Report Number: 564014	
Location: Inchamore, Co. Cork	Order Number:	Superseded Report:	

Test Completion Dates

Lab Sample No(s)	22656606	22656623	22656636	22656649
Customer Sample Ref.	3188-SW1	3188-SW2	3188-SW3	3188-SW4
AGS Ref.				
Depth	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

	22656606	22656623	22656636	22656649
Alkalinity as CaCO3	19-Aug-2020	19-Aug-2020	19-Aug-2020	19-Aug-2020
Ammonium Low	18-Aug-2020	19-Aug-2020	18-Aug-2020	18-Aug-2020
Anions by Kone (w)	17-Aug-2020	19-Aug-2020	19-Aug-2020	19-Aug-2020
Colour Test	18-Aug-2020	18-Aug-2020	18-Aug-2020	18-Aug-2020
Conductivity (at 20 deg.C)	19-Aug-2020	19-Aug-2020	19-Aug-2020	19-Aug-2020
Nitrite by Kone (w)	17-Aug-2020	19-Aug-2020	19-Aug-2020	17-Aug-2020
pH Value	19-Aug-2020	19-Aug-2020	19-Aug-2020	19-Aug-2020
Phosphate by Kone (w)	20-Aug-2020	20-Aug-2020	20-Aug-2020	20-Aug-2020
Suspended Solids	20-Aug-2020	19-Aug-2020	19-Aug-2020	19-Aug-2020
Total Metals by ICP-MS	19-Aug-2020	19-Aug-2020	19-Aug-2020	19-Aug-2020
Turbidity in waters	18-Aug-2020	18-Aug-2020	18-Aug-2020	18-Aug-2020



CERTIFICATE OF ANALYSIS

SDG: 200814-71 Client Reference: 3188-A2-COC1 Report Number: 564014
 Location: Inchamore, Co. Cork Order Number: Superseded Report:

Appendix

General

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.

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
§	Sampled on date not provided
◆	Sample holding time exceeded in laboratory
@	Sample holding time exceeded due to late arrival of instructions or samples

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

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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Taney hall
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Dublin
Dublin 14

Attention: Sven Klinkenbergh

CERTIFICATE OF ANALYSIS

Date of report Generation: 05 September 2020
Customer: Minerex Environmental
Sample Delivery Group (SDG): 200828-87
Your Reference: 3188-A2-COC2
Location: Inchamore, Co. Cork
Report No: 566071

We received 4 samples on Friday August 28, 2020 and 4 of these samples were scheduled for analysis which was completed on Saturday September 05, 2020. 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: 200828-87 **Client Reference:** 3188-A2-COC2 **Report Number:** 566071
Location: Inchamore, Co. Cork **Order Number:** **Superseded Report:**

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
22737270	3188-SW1		0.00 - 0.00	27/08/2020
22737286	3188-SW2		0.00 - 0.00	26/08/2020
22737302	3188-SW3		0.00 - 0.00	26/08/2020
22737315	3188-SW4		0.00 - 0.00	26/08/2020

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



CERTIFICATE OF ANALYSIS

Validated

SDG: 200828-87	Client Reference: 3188-A2-COC2	Report Number: 566071
Location: Inchamore, Co. Cork	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)	Customer Sample Reference	AGS Reference	Depth (m)	Container												Sample Type		
					500ml Plastic (ALE208)	H2SO4 (ALE244)	HNO3 Unfiltered (ALE204)	NaOH (ALE245)	500ml Plastic (ALE208)	H2SO4 (ALE244)	HNO3 Unfiltered (ALE204)	NaOH (ALE245)	500ml Plastic (ALE208)	H2SO4 (ALE244)	HNO3 Unfiltered (ALE204)	NaOH (ALE245)			
Alkalinity as CaCO3	All	NDPs: 0 Tests: 4				X			X			X			X				
Ammonium Low	All	NDPs: 0 Tests: 4					X			X			X			X			
Anions by Kone (w)	All	NDPs: 0 Tests: 4				X			X			X			X				
Colour Test	All	NDPs: 0 Tests: 4				X			X			X			X				
Conductivity (at 20 deg.C)	All	NDPs: 0 Tests: 4				X			X			X			X				
Nitrite by Kone (w)	All	NDPs: 0 Tests: 4						X			X			X				X	
pH Value	All	NDPs: 0 Tests: 4				X			X			X			X				
Phosphate by Kone (w)	All	NDPs: 0 Tests: 4				X			X			X			X				
Suspended Solids	All	NDPs: 0 Tests: 4				X			X			X			X				
Total Metals by ICP-MS	All	NDPs: 0 Tests: 4					X			X			X			X			
Turbidity in waters	All	NDPs: 0 Tests: 4				X			X			X			X				



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Validated

SDG: 200828-87 Client Reference: 3188-A2-COC2 Report Number: 566071
Location: Inchamore, Co. Cork Order Number: Superseded Report:

Table with columns: Results Legend, Customer Sample Ref., 3188-SW1, 3188-SW2, 3188-SW3, 3188-SW4. Rows include: Suspended solids, Total; Alkalinity, Total as CaCO3; Ammoniacal Nitrogen as N (low level); Conductivity @ 20 deg.C; Phosphorus (tot.unfilt); Nitrite as NO2; Phosphate (Ortho as P); Nitrate as NO3; Turbidity; pH; Apparent Colour; True Colour.



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Validated

SDG: 200828-87 **Client Reference:** 3188-A2-COC2 **Report Number:** 566071
Location: Inchamore, Co. Cork **Order Number:** **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
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	Method 3125B, AWWA/APHA, 20th Ed., 1999	Analysis of Aqueous Samples by ICP-MS
TM184	EPA Methods 325.1 & 325.2,	The Determination of Anions in Aqueous Matrices using the Kone Spectrophotometric Analysers
TM195	Colour and Turbidity of water. Methods for the Examination of Waters and Associated Materials. HMSO, 1981, ISBN 0 11 751955 3.	Determination of Turbidity in Waters & Associated Matrices
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TM261	Colour and Turbidity of Waters, Methods for the Examination of Waters and Associated Materials, HMSO, 1981, ISBN 0 11 7519553.	Determination of True and Apparent Colour by Spectrophotometry

NA = not applicable.

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SDG: 200828-87	Client Reference: 3188-A2-COC2	Report Number: 566071	
Location: Inchamore, Co. Cork	Order Number:	Superseded Report:	

Test Completion Dates

Lab Sample No(s)	22737270	22737286	22737302	22737315
Customer Sample Ref.	3188-SW1	3188-SW2	3188-SW3	3188-SW4
AGS Ref.				
Depth	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

	22737270	22737286	22737302	22737315
Alkalinity as CaCO3	04-Sep-2020	04-Sep-2020	04-Sep-2020	03-Sep-2020
Ammonium Low	03-Sep-2020	03-Sep-2020	05-Sep-2020	05-Sep-2020
Anions by Kone (w)	03-Sep-2020	03-Sep-2020	03-Sep-2020	03-Sep-2020
Colour Test	03-Sep-2020	03-Sep-2020	03-Sep-2020	03-Sep-2020
Conductivity (at 20 deg.C)	02-Sep-2020	02-Sep-2020	02-Sep-2020	02-Sep-2020
Nitrite by Kone (w)	03-Sep-2020	03-Sep-2020	03-Sep-2020	03-Sep-2020
pH Value	02-Sep-2020	02-Sep-2020	02-Sep-2020	02-Sep-2020
Phosphate by Kone (w)	03-Sep-2020	03-Sep-2020	03-Sep-2020	03-Sep-2020
Suspended Solids	03-Sep-2020	03-Sep-2020	03-Sep-2020	03-Sep-2020
Total Metals by ICP-MS	04-Sep-2020	04-Sep-2020	04-Sep-2020	04-Sep-2020
Turbidity in waters	03-Sep-2020	03-Sep-2020	03-Sep-2020	03-Sep-2020



CERTIFICATE OF ANALYSIS

SDG: 200828-87 Client Reference: 3188-A2-COC2 Report Number: 566071
 Location: Inchamore, Co. Cork Order Number: Superseded Report:

Appendix

General

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.

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
§	Sampled on date not provided
◆	Sample holding time exceeded in laboratory
@	Sample holding time exceeded due to late arrival of instructions or samples

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

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: Sven Klinkenbergh

CERTIFICATE OF ANALYSIS

Date of report Generation: 04 March 2021
Customer: Minerex Environmental
Sample Delivery Group (SDG): 210301-15
Your Reference: 3188-A2-COC4
Location: Inchamore, Co. Cork
Report No: 589280

We received 4 samples on Monday March 01, 2021 and 4 of these samples were scheduled for analysis which was completed on Thursday March 04, 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: 210301-15 **Client Reference:** 3188-A2-COC4 **Report Number:** 589280
Location: Inchamore, Co. Cork **Order Number:** **Superseded Report:**

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
23815010	3188-A2-SW1 (Inch. 1)		0.00 - 0.00	24/02/2021
23815030	3188-A2-SW2 (Inch. 2)		0.00 - 0.00	24/02/2021
23815049	3188-A2-SW3 (Inch. 3)		0.00 - 0.00	24/02/2021
23815061	3188-A2-SW4 (Inch. 4)		0.00 - 0.00	24/02/2021

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



CERTIFICATE OF ANALYSIS

SDG: 210301-15 Client Reference: 3188-A2-COC4 Report Number: 589280
 Location: Inchamore, Co. Cork 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)	Customer Sample Reference	AGS Reference	Depth (m)	Container	Sample Type
23815010	3188-A2-SW1 (Inch. 1)		0.00 - 0.00	500ml Plastic (ALE208) H2SO4 (ALE244) NaOH (ALE245) 500ml Plastic (ALE208)	SW SW SW SW
23815030	3188-A2-SW2 (Inch. 2)		0.00 - 0.00	HNO3 Unfiltered (ALE204) H2SO4 (ALE244) NaOH (ALE245) 500ml Plastic (ALE208)	SW SW SW SW
23815049	3188-A2-SW3 (Inch. 3)		0.00 - 0.00	HNO3 Unfiltered (ALE204) H2SO4 (ALE244) NaOH (ALE245) 500ml Plastic (ALE208)	SW SW SW SW
23815061	3188-A2-SW4 (Inch. 4)		0.00 - 0.00	HNO3 Unfiltered (ALE204) H2SO4 (ALE244) NaOH (ALE245) 500ml Plastic (ALE208)	SW SW SW SW

Parameter	Notes	Test 1	Test 2	Test 3	Test 4
Alkalinity as CaCO3	All NDPs: 0 Tests: 4	X	X	X	X
Ammonium Low	All NDPs: 0 Tests: 4		X	X	X
Anions by Kone (w)	All NDPs: 0 Tests: 4	X	X	X	X
Colour Test	All NDPs: 0 Tests: 4	X	X	X	X
Conductivity (at 20 deg.C)	All NDPs: 0 Tests: 4	X	X	X	X
Nitrite by Kone (w)	All NDPs: 0 Tests: 4		X	X	X
pH Value	All NDPs: 0 Tests: 4	X	X	X	X
Phosphate by Kone (w)	All NDPs: 0 Tests: 4	X	X	X	X
Suspended Solids	All NDPs: 0 Tests: 4	X	X	X	X
Total Metals by ICP-MS	All NDPs: 0 Tests: 4	X		X	X
Turbidity in waters	All NDPs: 0 Tests: 4	X	X	X	X



CERTIFICATE OF ANALYSIS

SDG: 210301-15 **Client Reference:** 3188-A2-COC4 **Report Number:** 589280
Location: Inchamore, Co. Cork **Order Number:** **Superseded Report:**

Results Legend		Customer Sample Ref.	3188-A2-SW1 (Inch. 1)		3188-A2-SW2 (Inch. 2)		3188-A2-SW3 (Inch. 3)		3188-A2-SW4 (Inch. 4)	
#	ISO17025 accredited.		Depth (m)	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.	Sample Type	Surface Water (SW)	Surface Water (SW)	Surface Water (SW)	Surface Water (SW)	Surface Water (SW)	Surface Water (SW)	Surface Water (SW)	
aq	Aqueous / settled sample.	Date Sampled	24/02/2021	24/02/2021	24/02/2021	24/02/2021	24/02/2021	24/02/2021	24/02/2021	
diss.filt	Dissolved / filtered sample.	Sample Time	00:00	00:00	00:00	00:00	00:00	00:00	00:00	
tot.unfilt	Total / unfiltered sample.	Date Received	01/03/2021	01/03/2021	01/03/2021	01/03/2021	01/03/2021	01/03/2021	01/03/2021	
	Subcontracted - refer to subcontractor report for accreditation status.	SDG Ref	210301-15	210301-15	210301-15	210301-15	210301-15	210301-15	210301-15	
	% 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	Lab Sample No.(s)	23815010	23815030	23815049	23815061				
(F)	Trigger breach confirmed	AGS Reference								
1-4*5@	Sample deviation (see appendix)									
Component	LOD/Units	Method								
Suspended solids, Total	<2 mg/l	TM022	<2	2.55	<2	<2	#	#	#	
Alkalinity, Total as CaCO3	<2 mg/l	TM043	2.5	4	2	3.5	#	#	#	
Alkalinity, Bicarbonate as CaCO3	<2 mg/l	TM043	2.5	4	2	3.5	#	#	#	
Ammoniacal Nitrogen as N (low level)	<0.01 mg/l	TM099	0.037	0.036	0.024	0.032	#	#	#	
Conductivity @ 20 deg.C	<0.02 mS/cm	TM120	0.025	0.0377	0.0281	0.0293	#	#	#	
Phosphorus (tot.unfilt)	<20 µg/l	TM152	<20	<20	<20	<20	#	#	#	
Nitrite as NO2	<0.05 mg/l	TM184	0.273	<0.05	<0.05	<0.05	#	#	#	
Phosphate (Ortho as P)	<0.02 mg/l	TM184	<0.02	<0.02	<0.02	<0.02	#	#	#	
Nitrate as NO3	<0.3 mg/l	TM184	<0.3	0.384	<0.3	<0.3	#	#	#	
Turbidity	<0.1 ntu	TM195	0.561	3.65	1.62	2.22	@ #	@ #	@ #	
pH	<1 pH Units	TM256	6.69	6.74	6.47	7.03	#	#	#	
Apparent Colour	<1 mg/l Pt/Co	TM261	37.4	75.2	52	61.3				
True Colour	<1 mg/l Pt/Co	TM261	31.4	61.2	44.2	51.4				



CERTIFICATE OF ANALYSIS

Validated

SDG: 210301-15
Location: Inchamore, Co. Cork

Client Reference: 3188-A2-COC4
Order Number:

Report Number: 589280
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
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	Method 3125B, AWWA/APHA, 20th Ed., 1999	Analysis of Aqueous Samples by ICP-MS
TM184	EPA Methods 325.1 & 325.2,	The Determination of Anions in Aqueous Matrices using the Kone Spectrophotometric Analysers
TM195	Colour and Turbidity of water. Methods for the Examination of Waters and Associated Materials. HMSO, 1981, ISBN 0 11 751955 3.	Determination of Turbidity in Waters & Associated Matrices
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
TM261	Colour and Turbidity of Waters, Methods for the Examination of Waters and Associated Materials, HMSO, 1981, ISBN 0 11 7519553.	Determination of True and Apparent Colour by Spectrophotometry

NA = not applicable.

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CERTIFICATE OF ANALYSIS

Validated

SDG: 210301-15
Location: Inchamore, Co. Cork

Client Reference: 3188-A2-COC4
Order Number:

Report Number: 589280
Superseded Report:

Test Completion Dates

Lab Sample No(s)	23815010	23815030	23815049	23815061
Customer Sample Ref.	3188-A2-SW1 (In ch. 1)	3188-A2-SW2 (In ch. 2)	3188-A2-SW3 (In ch. 3)	3188-A2-SW4 (In ch. 4)
AGS Ref.				
Depth	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

Alkalinity as CaCO3	03-Mar-2021	03-Mar-2021	03-Mar-2021	03-Mar-2021
Ammonium Low	04-Mar-2021	04-Mar-2021	04-Mar-2021	04-Mar-2021
Anions by Kone (w)	04-Mar-2021	04-Mar-2021	04-Mar-2021	04-Mar-2021
Colour Test	04-Mar-2021	04-Mar-2021	04-Mar-2021	04-Mar-2021
Conductivity (at 20 deg.C)	03-Mar-2021	03-Mar-2021	03-Mar-2021	03-Mar-2021
Nitrite by Kone (w)	02-Mar-2021	02-Mar-2021	02-Mar-2021	02-Mar-2021
pH Value	02-Mar-2021	02-Mar-2021	02-Mar-2021	02-Mar-2021
Phosphate by Kone (w)	02-Mar-2021	02-Mar-2021	02-Mar-2021	03-Mar-2021
Suspended Solids	02-Mar-2021	02-Mar-2021	02-Mar-2021	02-Mar-2021
Total Metals by ICP-MS	03-Mar-2021	03-Mar-2021	03-Mar-2021	03-Mar-2021
Turbidity in waters	02-Mar-2021	02-Mar-2021	02-Mar-2021	02-Mar-2021



CERTIFICATE OF ANALYSIS

SDG: 210301-15 Client Reference: 3188-A2-COC4 Report Number: 589280
 Location: Inchamore, Co. Cork Order Number: Superseded Report:

Appendix

General

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.

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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

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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.