



## CERTIFICATE OF ANALYSIS

Work Order	: LE2306989	Page	: 1 of 7
Client	: Matis ohf	Project	: ----
Contact	: Hrölfur Sigurdsson	Purchase Number	: LE2306989
Address	: Vinlandsleid 12 -113 Reykjavik Iceland	Sampler	: ----
E-mail	: hrolfur@matis.is	Site	: ----
Telephone	: 3544225000	Date Samples Received	: 2023-05-17 11:00
C-O-C number	: ----	Date Analysis Commenced	: 2023-05-19
Quote number	: ST2021SE-MAT-OHF0001 (OF210481)	Issue Date	: 2023-05-24 15:03
		No. of samples received	: 5
		No. of samples analysed	: 5

### General Comments

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### Signatories

### Position

Ilya Rodushkin

Laboratory Manager



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## Analytical Results

Parameter	Result	Client sample ID						Method	Issuer
		R23-1009-1/S1							
		Laboratory sample ID							
		LE2306989-001							
Client sampling date / time		Not specified							
	MU	Unit	LOR	Package					
<b>Sample Pre-Preparation</b>									
Drying	Yes	----	-	-	M-KM1	S-PP-dry50	LE		
Sieving/grinding	Yes	----	-	-	M-KM1	S-PP-siev/grind	LE		
<b>Sample Preparation</b>									
Digestion	Yes	----	-	-	M-KM1	S-PM59-HB	LE		
Digestion AR	Yes	----	-	-	M-KM1	S-PAR53-HB	LE		
<b>Total Metals/Major Cations</b>									
Arsenic	<0.5	----	mg/kg DW	0.500	M-KM1	S-SFMS-59	LE		
Barium	40.5	± 5.2	mg/kg DW	1.00	M-KM1	S-SFMS-59	LE		
Cadmium	<0.1	----	mg/kg DW	0.100	M-KM1	S-SFMS-59	LE		
Chromium	168	± 24	mg/kg DW	0.200	M-KM1	S-SFMS-59	LE		
Cobalt	40.9	± 5.4	mg/kg DW	0.100	M-KM1	S-SFMS-59	LE		
Copper	111	± 15	mg/kg DW	0.300	M-KM1	S-SFMS-59	LE		
Lead	<1	----	mg/kg DW	1.00	M-KM1	S-SFMS-59	LE		
Mercury	<0.2	----	mg/kg DW	0.200	M-KM1	S-SFMS-59	LE		
Nickel	142	± 20	mg/kg DW	0.200	M-KM1	S-SFMS-59	LE		
Vanadium	160	± 20	mg/kg DW	0.200	M-KM1	S-SFMS-59	LE		
Zinc	52.3	± 7.4	mg/kg DW	1.00	M-KM1	S-SFMS-59	LE		
Antimony	<0.05	----	mg/kg DW	0.0500	M-KM1	S-SFMS-53	LE		
Molybdenum	0.395	± 0.063	mg/kg DW	0.200	M-KM1	S-SFMS-53	LE		
Silver	<0.05	----	mg/kg DW	0.0500	M-KM1	S-SFMS-53	LE		
Tin	0.535	± 0.141	mg/kg DW	0.500	M-KM1	S-SFMS-53	LE		
<b>Physical Parameters</b>									
Dry matter @ 105°C	91.8	± 2.00	%	1.00	M-KM1	TS-105	LE		



Sub-Matrix: SOIL		Client sample ID		R23-1009-2/S2				
		Laboratory sample ID		LE2306989-002				
		Client sampling date / time		Not specified				
Parameter	Result	MU	Unit	LOR	Package	Method	Issuer	
<b>Sample Pre-Preparation</b>								
Drying	Yes	----	-	-	M-KM1	S-PP-dry50	LE	
Sieving/grinding	Yes	----	-	-	M-KM1	S-PP-siev/grind	LE	
<b>Sample Preparation</b>								
Digestion AR	Yes	----	-	-	M-KM1	S-PAR53-HB	LE	
Digestion	Yes	----	-	-	P-7MHNO3-HB	S-PM59-HB	LE	
<b>Total Metals/Major Cations</b>								
Arsenic	<0.5	----	mg/kg DW	0.500	M-KM1	S-SFMS-59	LE	
Barium	44.2	± 5.7	mg/kg DW	1.00	M-KM1	S-SFMS-59	LE	
Cadmium	<0.1	----	mg/kg DW	0.100	M-KM1	S-SFMS-59	LE	
Chromium	187	± 26	mg/kg DW	0.200	M-KM1	S-SFMS-59	LE	
Cobalt	44.0	± 5.9	mg/kg DW	0.100	M-KM1	S-SFMS-59	LE	
Copper	123	± 17	mg/kg DW	0.300	M-KM1	S-SFMS-59	LE	
Lead	<1	----	mg/kg DW	1.00	M-KM1	S-SFMS-59	LE	
Mercury	<0.2	----	mg/kg DW	0.200	M-KM1	S-SFMS-59	LE	
Nickel	157	± 23	mg/kg DW	0.200	M-KM1	S-SFMS-59	LE	
Vanadium	164	± 21	mg/kg DW	0.200	M-KM1	S-SFMS-59	LE	
Zinc	56.5	± 8.0	mg/kg DW	1.00	M-KM1	S-SFMS-59	LE	
Antimony	<0.05	----	mg/kg DW	0.0500	M-KM1	S-SFMS-53	LE	
Molybdenum	0.398	± 0.063	mg/kg DW	0.200	M-KM1	S-SFMS-53	LE	
Silver	<0.05	----	mg/kg DW	0.0500	M-KM1	S-SFMS-53	LE	
Tin	<0.5	----	mg/kg DW	0.500	M-KM1	S-SFMS-53	LE	
<b>Physical Parameters</b>								
Dry matter @ 105°C	91.3	± 2.00	%	1.00	M-KM1	TS-105	LE	



Parameter	Result	MU	Unit	LOR	Package	Method	Issuer
Sub-Matrix: SOIL		Client sample ID		R23-1009-3/S3			
		Laboratory sample ID		LE2306989-003			
		Client sampling date / time		Not specified			
<b>Sample Pre-Preparation</b>							
Drying	Yes	----	-	-	M-KM1	S-PP-dry50	LE
Sieving/grinding	Yes	----	-	-	M-KM1	S-PP-siev/grind	LE
<b>Sample Preparation</b>							
Digestion AR	Yes	----	-	-	M-KM1	S-PAR53-HB	LE
Digestion	Yes	----	-	-	P-7MHNO3-HB	S-PM59-HB	LE
<b>Total Metals/Major Cations</b>							
Arsenic	<0.5	----	mg/kg DW	0.500	M-KM1	S-SFMS-59	LE
Barium	30.3	± 3.9	mg/kg DW	1.00	M-KM1	S-SFMS-59	LE
Cadmium	<0.1	----	mg/kg DW	0.100	M-KM1	S-SFMS-59	LE
Chromium	126	± 18	mg/kg DW	0.200	M-KM1	S-SFMS-59	LE
Cobalt	34.2	± 4.6	mg/kg DW	0.100	M-KM1	S-SFMS-59	LE
Copper	89.0	± 12.2	mg/kg DW	0.300	M-KM1	S-SFMS-59	LE
Lead	<1	----	mg/kg DW	1.00	M-KM1	S-SFMS-59	LE
Mercury	<0.2	----	mg/kg DW	0.200	M-KM1	S-SFMS-59	LE
Nickel	136	± 19	mg/kg DW	0.200	M-KM1	S-SFMS-59	LE
Vanadium	108	± 14	mg/kg DW	0.200	M-KM1	S-SFMS-59	LE
Zinc	44.7	± 6.4	mg/kg DW	1.00	M-KM1	S-SFMS-59	LE
Antimony	<0.05	----	mg/kg DW	0.0500	M-KM1	S-SFMS-53	LE
Molybdenum	0.358	± 0.058	mg/kg DW	0.200	M-KM1	S-SFMS-53	LE
Silver	<0.05	----	mg/kg DW	0.0500	M-KM1	S-SFMS-53	LE
Tin	0.512	± 0.136	mg/kg DW	0.500	M-KM1	S-SFMS-53	LE
<b>Physical Parameters</b>							
Dry matter @ 105°C	89.0	± 2.00	%	1.00	M-KM1	TS-105	LE



Sub-Matrix: SOIL		Client sample ID		R23-1009-4/S4			
		Laboratory sample ID		LE2306989-004			
		Client sampling date / time		Not specified			
Parameter	Result	MU	Unit	LOR	Package	Method	Issuer
<b>Sample Pre-Preparation</b>							
Drying	Yes	----	-	-	M-KM1	S-PP-dry50	LE
Sieving/grinding	Yes	----	-	-	M-KM1	S-PP-siev/grind	LE
<b>Sample Preparation</b>							
Digestion AR	Yes	----	-	-	M-KM1	S-PAR53-HB	LE
Digestion	Yes	----	-	-	P-7MHNO3-HB	S-PM59-HB	LE
<b>Total Metals/Major Cations</b>							
Arsenic	<0.5	----	mg/kg DW	0.500	M-KM1	S-SFMS-59	LE
Barium	34.5	± 4.4	mg/kg DW	1.00	M-KM1	S-SFMS-59	LE
Cadmium	<0.1	----	mg/kg DW	0.100	M-KM1	S-SFMS-59	LE
Chromium	137	± 19	mg/kg DW	0.200	M-KM1	S-SFMS-59	LE
Cobalt	35.0	± 4.7	mg/kg DW	0.100	M-KM1	S-SFMS-59	LE
Copper	104	± 14	mg/kg DW	0.300	M-KM1	S-SFMS-59	LE
Lead	<1	----	mg/kg DW	1.00	M-KM1	S-SFMS-59	LE
Mercury	<0.2	----	mg/kg DW	0.200	M-KM1	S-SFMS-59	LE
Nickel	126	± 18	mg/kg DW	0.200	M-KM1	S-SFMS-59	LE
Vanadium	124	± 16	mg/kg DW	0.200	M-KM1	S-SFMS-59	LE
Zinc	48.6	± 6.9	mg/kg DW	1.00	M-KM1	S-SFMS-59	LE
Antimony	<0.05	----	mg/kg DW	0.0500	M-KM1	S-SFMS-53	LE
Molybdenum	0.326	± 0.053	mg/kg DW	0.200	M-KM1	S-SFMS-53	LE
Silver	<0.05	----	mg/kg DW	0.0500	M-KM1	S-SFMS-53	LE
Tin	0.549	± 0.145	mg/kg DW	0.500	M-KM1	S-SFMS-53	LE
<b>Physical Parameters</b>							
Dry matter @ 105°C	90.4	± 2.00	%	1.00	M-KM1	TS-105	LE



Parameter	Result	MU	Unit	LOR	Package	Method	Issuer
Sub-Matrix: SOIL		Client sample ID		R23-1009-5/S5			
		Laboratory sample ID		LE2306989-005			
		Client sampling date / time		Not specified			
<b>Sample Pre-Preparation</b>							
Drying	Yes	----	-	-	M-KM1	S-PP-dry50	LE
Sieving/grinding	Yes	----	-	-	M-KM1	S-PP-siev/grind	LE
<b>Sample Preparation</b>							
Digestion AR	Yes	----	-	-	M-KM1	S-PAR53-HB	LE
Digestion	Yes	----	-	-	P-7MHNO3-HB	S-PM59-HB	LE
<b>Total Metals/Major Cations</b>							
Arsenic	<0.5	----	mg/kg DW	0.500	M-KM1	S-SFMS-59	LE
Barium	39.1	± 5.0	mg/kg DW	1.00	M-KM1	S-SFMS-59	LE
Cadmium	<0.1	----	mg/kg DW	0.100	M-KM1	S-SFMS-59	LE
Chromium	145	± 20	mg/kg DW	0.200	M-KM1	S-SFMS-59	LE
Cobalt	37.8	± 5.0	mg/kg DW	0.100	M-KM1	S-SFMS-59	LE
Copper	104	± 14	mg/kg DW	0.300	M-KM1	S-SFMS-59	LE
Lead	<1	----	mg/kg DW	1.00	M-KM1	S-SFMS-59	LE
Mercury	<0.2	----	mg/kg DW	0.200	M-KM1	S-SFMS-59	LE
Nickel	147	± 21	mg/kg DW	0.200	M-KM1	S-SFMS-59	LE
Vanadium	134	± 17	mg/kg DW	0.200	M-KM1	S-SFMS-59	LE
Zinc	52.2	± 7.4	mg/kg DW	1.00	M-KM1	S-SFMS-59	LE
Antimony	<0.05	----	mg/kg DW	0.0500	M-KM1	S-SFMS-53	LE
Molybdenum	0.351	± 0.057	mg/kg DW	0.200	M-KM1	S-SFMS-53	LE
Silver	<0.05	----	mg/kg DW	0.0500	M-KM1	S-SFMS-53	LE
Tin	<0.5	----	mg/kg DW	0.500	M-KM1	S-SFMS-53	LE
<b>Physical Parameters</b>							
Dry matter @ 105°C	89.7	± 2.00	%	1.00	M-KM1	TS-105	LE

The end of result part of the certificate of analysis

## Brief Method Summaries

Analytical Methods	Method Reference
S-PP-dry50	Sample dried at 50°C.
S-PP-siev/grind	Soil samples are sieved <2mm according to ISO 11464:2006. Sediment and sludge are homogenized by grinding.
S-SFMS-53	Determination of metals in soil, sludge, sediment and construction material by ICP-SFMS according to SS-EN ISO 17294-2:2016 and US EPA Method 200.8:1994. Prior to analysis the sample is digested according to S-PAR53-HB.
S-SFMS-59	Determination of metals in soil, sludge, sediment and construction material by ICP-SFMS according to SS-EN ISO 17294-2:2016 and US EPA Method 200.8:1994. Prior to analysis the sample is digested according to S-PM59-HB.
TS-105	Determination of dry weight (DW) according to SS-EN 15934:2012 ed 1.

Preparation Methods	Method Reference
S-PAR53-HB	Aqua regia digestion in hotblock according to SE-SOP-0047 (SS-EN ISO 54321:2021 and SS-EN 16174:2012).
S-PM59-HB	Digestion in 7M nitric acid in hotblock according to SE-SOP-0021.



**Key:** **LOR** = Limit of reporting represents the standard LOR for the respective parameters in each method. Note that limits of reporting may be affected if, e.g. additional dilution was required because of matrix effects, or the sample quantity was limited.

**MU** = Measurement Uncertainty

\* = Symbol succeeding any result indicates laboratory or subcontractor non-accredited test.

**Measurement Uncertainty:**

*The uncertainty is given as extended uncertainty (according to the definition in "Guide to the Expression of Measurement", JCGM 100:2008 Corrected version 2010) calculated with a coverage factor of 2, which give level of approximately 95%. Measurement of uncertainty is reported only for detected substances with levels above the reporting limits.*

*The uncertainty from subcontractors is often given as extended uncertainty calculated with a coverage factor of 2. Contact the laboratory for further information.*

**Issuing lab**

	<i>Issuer</i>
LE	<i>The analysis is provided by ALS Scandinavia AB Luleå, Aurorum 10 Luleå Sweden 977 75 Accredited by: SWEDAC Accreditation Number: 2030, ISO/IEC 17025</i>