



Industry, Energy and Technology

Mines

**HUMUS-GEOCHEMISTRY DATA TARGETING
CRITICAL METALS (BASE METALS, PGES, REES, U)
IN THE ALEXIS RIVER VALLEY REGION
(NTS MAP AREAS 13A/10, 14 AND 15),
SOUTHEASTERN LABRADOR**

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Open File 013A//0125



St. John's, Newfoundland
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INTRODUCTION

A humus- and till-sampling survey was completed in the Alexis River Valley region (NTS map areas 13A/10, 14 and 15) in southeastern Labrador during the 2023 field season (Figure 1; Hashmi, 2024). This data release presents the analytical results and summary notes for 76 humus samples.

METHODS

SAMPLE COLLECTION

Humus samples, weighing approximately 1 kg were collected using a knife and a reciprocating saw *via* truck, foot traverse and helicopter. Quality control measures in the field included thorough cleaning of sampling equipment between sample sites to reduce cross-contamination. Field

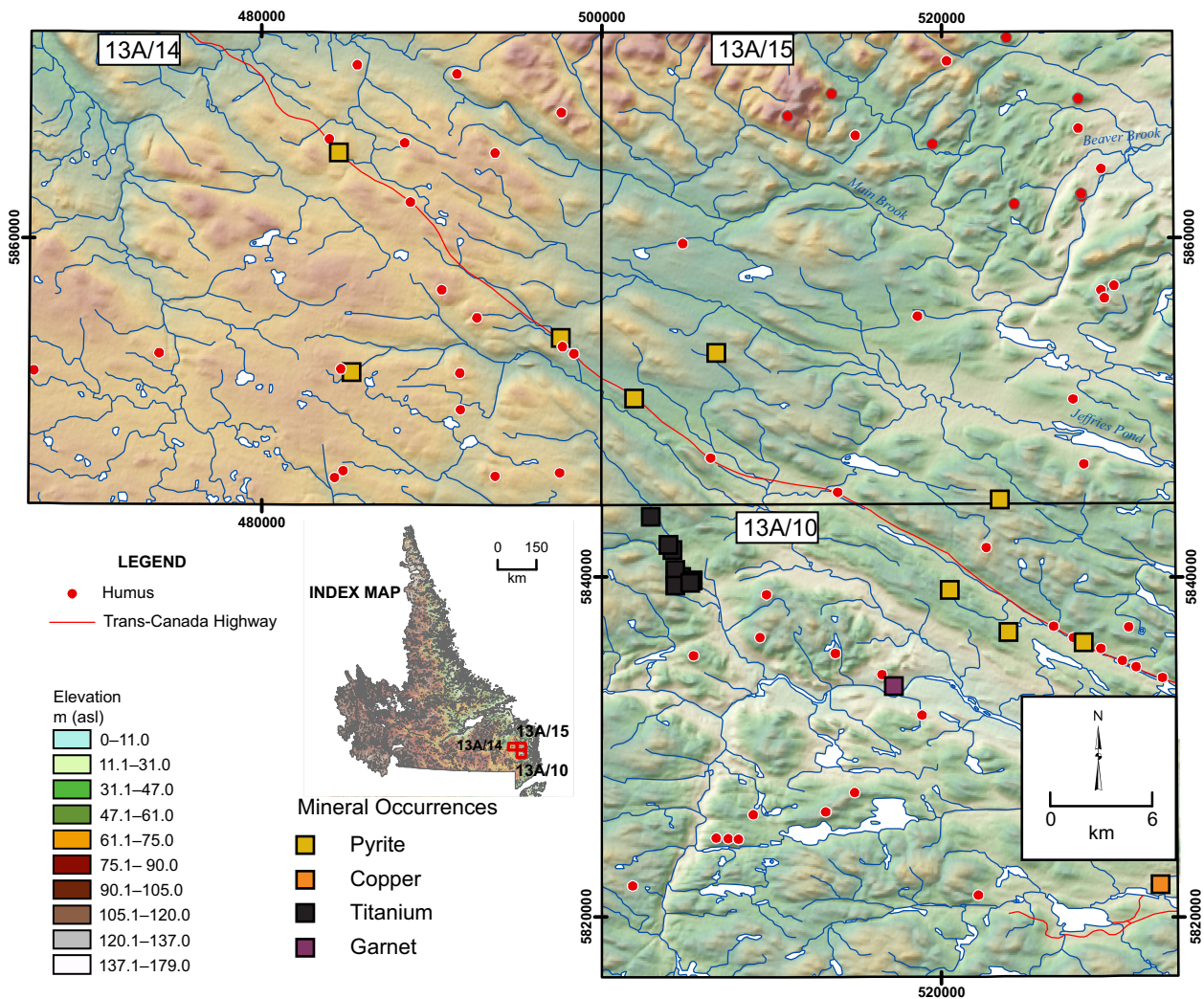


Figure 1. Humus sampling sites from 2023 field season in the Alexis River Valley region, underlain by topographic hill shade.

duplicates were collected at a frequency of one duplicate per 10 samples to test site variability. Detailed observations and photographs were collected at each site (*see* Hashmi, 2024).

SAMPLE PREPARATION

The humus samples were prepared and analyzed by ALS Canada Ltd. in North Vancouver, British Columbia. At ALS Canada Ltd., the samples were dried (ALS code: DRY-22), milled (ALS code: VEG-MILL01) and sieved through a 180 µm sieve (ALS code: PREP-41) and subsequently ashed. Here, an approximately 40 g prepared humus aliquot is ashed (decomposed) at 475°C for 24 hours (ALS code: VEG-ASH01), with an ashed yield of approximately 2–4% of the dried, pre-ashed sample weight. Ashing concentrates the element content such that the back calculation to pre-ashed sample weight can reduce the detection limit by an order of magnitude.

ANALYTICAL TECHNIQUES

The prepared humus samples underwent analyses described below and presented in Appendix A.

- 1) A 0.25 g ashed aliquot underwent *aqua regia* digestion (1:3 nitric to hydrochloric acid) with an inductively coupled plasma-mass spectrometry (ICP-MS) finish and inductively coupled plasma-atomic emission spectroscopy (ICP-AES) finish (ALS code: ME-VEG41a). An additional package to determine rare-earth elements (REEs) was also added to this procedure (ALS code: VEG41a-REE). This analysis is abbreviated as “VEG” in Appendix A and, pre- and post-ashing weights are denoted by “ASH1” and “ASH2”, respectively;
- 2) Additionally, a back calculation was also requested for analyses (ME-VEG41a and VEG41a-REE) on the ashed humus samples to determine element concentrations in the original prepared aliquot, *i.e.*, the dried and separated humus sample. These calculated values, ALS Code VEG41a-FAC and VEGFAC-REE, are the elemental concentrations of the ashed humus factored by the ratio of the weight of the sample before and after ashing. The geochemical results from this method are abbreviated as “VGF”; and
- 3) Loss on ignition (LOI) was performed on a prepared 1 g humus sample. Here the sample is placed in a muffle furnace for 1 hour at 1000°C and then re-weighed. The percentage of organic matter present in the sample is calculated from the difference in weight (ALS Code: OA-GRA05). This analysis is abbreviated as “OA”.

RESULTS

The following information is presented in Appendix A): sample number, year, location, elevation, horizon, depth, map unit, additional notes on location and the elements analyzed. Major elements are reported in wt. %, whereas minor and trace elements are reported in ppm. Negative values represent results below the reporting limit; above reporting limit values are indicated by a “0.1” added to the number. For example, values for Ca, Cr and Fe in Appendix A above the upper reporting limit are indicated by “2.1”, “12.6” and “2500.1”. A value of “-9” indicates that a sample

was not analyzed for that element. Different analytical procedures are indicated by suffixes; refer to Table 1 for a list of analytical methods for each element and associated abbreviations in column headers (*see above*). All location data is projected in Universal Transverse Mercator (UTM) easting and northing, zone 21, NAD 27 datum.

ACKNOWLEDGMENTS

The following individuals are thanked for their efforts with this data release: Kim Morgan for cartography and GIS support, and Megan Reardon and Sara Jenkins for reviewing the database and report.

REFERENCE

Hashmi, S.

2024: New surficial geochemistry and indicator-mineral survey to target critical metals (base metals, PGEs, REEs, U): revisiting the Alexis River Valley region (NTS map areas 13A/10, 14 and 15), southeastern Labrador. *In* Current Research. Government of Newfoundland and Labrador, Department of Industry, Energy and Technology, Geological Survey, Report 24-1, pages 127-138.

Table 1. Analytical information pertaining to humus samples

Element	Laboratory	Method	Abbreviation/ suffix	Appendix	Unit	Lower reporting limit (LRL)	Samples below LRL	Minimum	Maximum	Samples above upper reporting limit (URL)	Samples analyzed
Initial ashed weight (01)	ALS Canada	ASH01	ASH1	A	grams	NA	0	32.90	41.20	0	76
Final ashed weight (02)	ALS Canada	ASH02	ASH2	A	grams	NA	0	0.53	27.90	0	76
Ag	ALS Canada	ME-VEG41a	VEG	A	ppm	0.001	0	0.02	58.3	0	76
Al	ALS Canada	ME-VEG41a	VEG	A	wt. %	0.01	0	0.64	16.00	0	76
As	ALS Canada	ME-VEG41a	VEG	A	ppm	0.01	0	0.53	46.50	0	76
Au	ALS Canada	ME-VEG41a	VEG	A	ppm	0.0002	3	0.0005	0.0218	0	76
B	ALS Canada	ME-VEG41a	VEG	A	ppm	1	0	2	170	0	76
Ba	ALS Canada	ME-VEG41a	VEG	A	ppm	0.1	0	31.0	2550.0	0	76
Be	ALS Canada	ME-VEG41a	VEG	A	ppm	0.01	0	0.11	6.18	0	76
Bi	ALS Canada	ME-VEG41a	VEG	A	ppm	0.001	0	0.045	4.540	0	76
Ca	ALS Canada	ME-VEG41a	VEG	A	wt. %	0.01	0	0.18	27.90	0	76
Cd	ALS Canada	ME-VEG41a	VEG	A	ppm	0.001	0	0.091	27.200	0	76
Ce	ALS Canada	ME-VEG41a	VEG	A	ppm	0.003	0	5.500	500.100	4	76
Co	ALS Canada	ME-VEG41a	VEG	A	ppm	0.002	0	4.640	183.000	0	76
Cr	ALS Canada	ME-VEG41a	VEG	A	ppm	0.01	0	17.35	250.10	0	76
Cs	ALS Canada	ME-VEG41a	VEG	A	ppm	0.005	0	0.513	8.490	0	76
Cu	ALS Canada	ME-VEG41a	VEG	A	ppm	0.01	0	25.30	214.00	0	76
Dy	ALS Canada	ME-VEG41a+REE	VEG	A	ppm	0.002	0	0.276	16.100	0	76
Er	ALS Canada	ME-VEG41a+REE	VEG	A	ppm	0.002	0	0.151	8.870	0	76
Eu	ALS Canada	ME-VEG41a+REE	VEG	A	ppm	0.002	0	0.124	5.720	0	76
Fe	ALS Canada	ME-VEG41a	VEG	A	ppm	1	0	7800	50000.1	2	76
Ga	ALS Canada	ME-VEG41a	VEG	A	ppm	0.004	0	3.630	21.300	0	76
Gd	ALS Canada	ME-VEG41a+REE	VEG	A	ppm	0.002	0	0.328	22.800	0	76
Ge	ALS Canada	ME-VEG41a	VEG	A	ppm	0.005	0	0.030	0.553	0	76
Hf	ALS Canada	ME-VEG41a	VEG	A	ppm	0.002	0	0.016	0.235	0	76
Hg	ALS Canada	ME-VEG41a	VEG	A	ppm	0.001	42	0.001	0.004	0	76
Ho	ALS Canada	ME-VEG41a+REE	VEG	A	ppm	0.001	0	0.051	3.140	0	76
In	ALS Canada	ME-VEG41a	VEG	A	ppm	0.005	0	0.014	0.347	0	76
K	ALS Canada	ME-VEG41a	VEG	A	wt. %	0.01	0	0.11	4.88	0	76
La	ALS Canada	ME-VEG41a	VEG	A	ppm	0.002	0	2.910	330.000	0	76
Li	ALS Canada	ME-VEG41a	VEG	A	ppm	0.1	0	0.8	12.5	0	76
Lu	ALS Canada	ME-VEG41a+REE	VEG	A	ppm	0.001	0	0.018	1.075	0	76
Mg	ALS Canada	ME-VEG41a	VEG	A	wt. %	0.001	0	0.080	15.900	0	76
Mn	ALS Canada	ME-VEG41a	VEG	A	ppm	0.1	0	58.1	6200.0	0	76
Mo	ALS Canada	ME-VEG41a	VEG	A	ppm	0.01	0	0.24	143.50	0	76
Na	ALS Canada	ME-VEG41a	VEG	A	wt. %	0.001	0	0.041	0.641	0	76
Nb	ALS Canada	ME-VEG41a	VEG	A	ppm	0.002	0	0.134	5.330	0	76
Nd	ALS Canada	ME-VEG41a+REE	VEG	A	ppm	0.001	0	2.410	264.000	0	76
Ni	ALS Canada	ME-VEG41a	VEG	A	ppm	0.04	0	25.30	809.00	0	76
P	ALS Canada	ME-VEG41a	VEG	A	wt. %	0.001	0	0.144	3.820	0	76
Pb	ALS Canada	ME-VEG41a	VEG	A	ppm	0.01	0	7.04	785.00	0	76
Pd	ALS Canada	ME-VEG41a	VEG	A	ppm	0.001	60	0.001	0.007	0	76
Pr	ALS Canada	ME-VEG41a+REE	VEG	A	ppm	0.002	0	0.612	77.100	0	76
Pt	ALS Canada	ME-VEG41a	VEG	A	ppm	0.002	62	0.002	0.004	0	76
Rb	ALS Canada	ME-VEG41a	VEG	A	ppm	0.01	0	7.85	240.00	0	76
Re	ALS Canada	ME-VEG41a	VEG	A	ppm	0.001	5	0.001	0.040	0	76
S	ALS Canada	ME-VEG41a	VEG	A	wt. %	0.01	0	0.05	4.76	0	76
Sb	ALS Canada	ME-VEG41a	VEG	A	ppm	0.01	0	0.07	14.70	0	76
Sc	ALS Canada	ME-VEG41a	VEG	A	ppm	0.01	0	2.14	39.70	0	76
Se	ALS Canada	ME-VEG41a	VEG	A	ppm	0.005	0	0.231	23.100	0	76
Sm	ALS Canada	ME-VEG41a+REE	VEG	A	ppm	0.003	0	0.419	35.800	0	76
Sn	ALS Canada	ME-VEG41a	VEG	A	ppm	0.01	0	0.74	30.30	0	76
Sr	ALS Canada	ME-VEG41a	VEG	A	ppm	0.02	0	9.79	2630.00	0	76
Ta	ALS Canada	ME-VEG41a	VEG	A	ppm	0.001	11	0.005	0.096	0	76
Tb	ALS Canada	ME-VEG41a+REE	VEG	A	ppm	0.001	0	0.050	2.820	0	76
Te	ALS Canada	ME-VEG41a	VEG	A	ppm	0.005	1	0.005	0.268	0	76
Th	ALS Canada	ME-VEG41a	VEG	A	ppm	0.002	0	0.499	32.600	0	76
Ti	ALS Canada	ME-VEG41a	VEG	A	wt. %	0.001	0	0.031	0.306	0	76
Tl	ALS Canada	ME-VEG41a	VEG	A	ppm	0.002	0	0.019	2.750	0	76
Tm	ALS Canada	ME-VEG41a+REE	VEG	A	ppm	0.001	0	0.021	1.230	0	76
U	ALS Canada	ME-VEG41a	VEG	A	ppm	0.005	0	0.179	19.250	0	76
V	ALS Canada	ME-VEG41a	VEG	A	ppm	0.05	0	21.00	162.50	0	76
W	ALS Canada	ME-VEG41a	VEG	A	ppm	0.01	0	0.03	1.18	0	76
Y	ALS Canada	ME-VEG41a	VEG	A	ppm	0.003	0	1.510	104.000	0	76
Yb	ALS Canada	ME-VEG41a+REE	VEG	A	ppm	0.003	0	0.133	7.620	0	76
Zn	ALS Canada	ME-VEG41a	VEG	A	ppm	0.1	0	13.6	2380.0	0	76
Zr	ALS Canada	ME-VEG41a	VEG	A	ppm	0.02	0	0.60	7.28	0	76

Table 1. Continued

Element	Laboratory	Method	Abbreviation/ suffix	Appendix	Unit	Lower reporting limit (LRL)	Samples below LRL	Minimum	Maximum	Samples above upper reporting limit (URL)	Samples analyzed
LOI	ALS Canada	OA-GRA05	OA	A	wt. %	0.01	0	31.70	98.90	0	76
Ag	ALS Canada	VEG41a-FAC	VEGF	A	ppm	0.00005	0	0.00547	2.56	0	76
Al	ALS Canada	VEG41a-FAC	VEGF	A	wt. %	0.0005	0	0.023	1.165	0	76
As	ALS Canada	VEG41a-FAC	VEGF	A	ppm	0.0005	0	0.1245	1.1500	0	76
Au	ALS Canada	VEG41a-FAC	VEGF	A	ppm	0.00001	3	0.00005	0.00076	0	76
B	ALS Canada	VEG41a-FAC	VEGF	A	ppm	0.05	0	0.60	6.07	0	76
Ba	ALS Canada	VEG41a-FAC	VEGF	A	ppm	0.005	0	1.915	235.000	0	76
Be	ALS Canada	VEG41a-FAC	VEGF	A	ppm	0.0005	0	0.0054	0.2470	0	76
Bi	ALS Canada	VEG41a-FAC	VEGF	A	ppm	0.00005	0	0.00443	0.16150	0	76
Ca	ALS Canada	VEG41a-FAC	VEGF	A	wt. %	0.0005	0	0.0218	2.1000	2	76
Cd	ALS Canada	VEG41a-FAC	VEGF	A	ppm	0.00005	0	0.03220	1.67000	0	76
Ce	ALS Canada	VEG41a-FAC	VEGF	A	ppm	0.0002	0	0.2050	25.1000	1	76
Co	ALS Canada	VEG41a-FAC	VEGF	A	ppm	0.0001	0	0.1075	6.0200	0	76
Cr	ALS Canada	VEG41a-FAC	VEGF	A	ppm	0.0005	0	0.3500	12.6000	13	76
Cs	ALS Canada	VEG41a-FAC	VEGF	A	ppm	0.0003	0	0.0329	0.8590	0	76
Cu	ALS Canada	VEG41a-FAC	VEGF	A	ppm	0.0005	0	1.2000	24.6000	0	76
Dy	ALS Canada	VEG41a-FAC	VEGF	A	ppm	0.0001	0	0.0074	1.0350	0	76
Er	ALS Canada	VEG41a-FAC	VEGF	A	ppm	0.0001	0	0.0040	0.6480	0	76
Eu	ALS Canada	VEG41a-FAC	VEGF	A	ppm	0.0001	0	0.0028	0.2580	0	76
Fe	ALS Canada	VEG41a-FAC	VEGF	A	ppm	0.05	0	157.00	2500.10	13	76
Ga	ALS Canada	VEG41a-FAC	VEGF	A	ppm	0.0002	0	0.0596	5.5200	0	76
Gd	ALS Canada	VEG41a-FAC	VEGF	A	ppm	0.0001	0	0.0105	1.2100	0	76
Ge	ALS Canada	VEG41a-FAC	VEGF	A	ppm	0.0003	0	0.0013	0.0482	0	76
Hf	ALS Canada	VEG41a-FAC	VEGF	A	ppm	0.0001	0	0.0002	0.0767	0	76
Hg	ALS Canada	VEG41a-FAC	VEGF	A	ppm	0.00005	54	0.00005	0.00076	0	76
Ho	ALS Canada	VEG41a-FAC	VEGF	A	ppm	0.00005	0	0.00142	0.21600	0	76
In	ALS Canada	VEG41a-FAC	VEGF	A	ppm	0.0003	0	0.0004	0.0152	0	76
K	ALS Canada	VEG41a-FAC	VEGF	A	wt. %	0.0005	0	0.0234	0.3160	0	76
La	ALS Canada	VEG41a-FAC	VEGF	A	ppm	0.0001	0	0.1040	17.1500	0	76
Li	ALS Canada	VEG41a-FAC	VEGF	A	ppm	0.005	0	0.032	3.790	0	76
Lu	ALS Canada	VEG41a-FAC	VEGF	A	ppm	0.00005	0	0.00053	0.07830	0	76
Mg	ALS Canada	VEG41a-FAC	VEGF	A	wt. %	0.00005	0	0.02910	0.41900	0	76
Mn	ALS Canada	VEG41a-FAC	VEGF	A	ppm	0.005	0	2.440	1570.000	0	76
Mo	ALS Canada	VEG41a-FAC	VEGF	A	ppm	0.0005	0	0.0294	11.5000	0	76
Na	ALS Canada	VEG41a-FAC	VEGF	A	wt. %	0.00005	0	0.00371	0.04010	0	76
Nb	ALS Canada	VEG41a-FAC	VEGF	A	ppm	0.0001	0	0.0099	0.5030	0	76
Nd	ALS Canada	VEG41a-FAC	VEGF	A	ppm	0.00005	0	0.09270	13.70000	0	76
Ni	ALS Canada	VEG41a-FAC	VEGF	A	ppm	0.002	0	1.320	33.900	0	76
P	ALS Canada	VEG41a-FAC	VEGF	A	wt. %	0.00005	0	0.02640	0.12200	0	76
Pb	ALS Canada	VEG41a-FAC	VEGF	A	ppm	0.0005	0	0.3200	33.4000	0	76
Pd	ALS Canada	VEG41a-FAC	VEGF	A	ppm	0.00005	65	0.00007	0.00174	0	76
Pr	ALS Canada	VEG41a-FAC	VEGF	A	ppm	0.0001	0	0.0231	4.0000	0	76
Pt	ALS Canada	VEG41a-FAC	VEGF	A	ppm	0.0001	66	0.0001	0.0009	0	76
Rb	ALS Canada	VEG41a-FAC	VEGF	A	ppm	0.0005	0	1.3450	26.2000	0	76
Re	ALS Canada	VEG41a-FAC	VEGF	A	ppm	0.00005	6	0.00005	0.00114	0	76
S	ALS Canada	VEG41a-FAC	VEGF	A	wt. %	0.0005	0	0.0161	0.0959	0	76
Sb	ALS Canada	VEG41a-FAC	VEGF	A	ppm	0.0005	0	0.0236	0.3670	0	76
Sc	ALS Canada	VEG41a-FAC	VEGF	A	ppm	0.0005	0	0.0576	2.4700	0	76
Se	ALS Canada	VEG41a-FAC	VEGF	A	ppm	0.0003	0	0.0514	0.7360	0	76
Sm	ALS Canada	VEG41a-FAC	VEGF	A	ppm	0.0002	0	0.0159	1.8600	0	76
Sn	ALS Canada	VEG41a-FAC	VEGF	A	ppm	0.0005	0	0.0308	0.9220	0	76
Sr	ALS Canada	VEG41a-FAC	VEGF	A	ppm	0.001	0	6.090	172.500	0	76
Ta	ALS Canada	VEG41a-FAC	VEGF	A	ppm	0.00005	11	0.00013	0.00510	0	76
Tb	ALS Canada	VEG41a-FAC	VEGF	A	ppm	0.00005	0	0.00137	0.16550	0	76
Te	ALS Canada	VEG41a-FAC	VEGF	A	ppm	0.0003	1	0.0005	0.0083	0	76
Th	ALS Canada	VEG41a-FAC	VEGF	A	ppm	0.0001	0	0.0251	1.8650	0	76
Ti	ALS Canada	VEG41a-FAC	VEGF	A	wt. %	0.00005	0	0.00062	0.11350	0	76
Tl	ALS Canada	VEG41a-FAC	VEGF	A	ppm	0.0001	0	0.0005	0.1935	0	76
Tm	ALS Canada	VEG41a-FAC	VEGF	A	ppm	0.00005	0	0.00057	0.09100	0	76
U	ALS Canada	VEG41a-FAC	VEGF	A	ppm	0.0003	0	0.0080	1.6350	0	76
V	ALS Canada	VEG41a-FAC	VEGF	A	ppm	0.003	0	0.282	112.000	0	76
W	ALS Canada	VEG41a-FAC	VEGF	A	ppm	0.0005	0	0.0050	0.1790	0	76
Y	ALS Canada	VEG41a-FAC	VEGF	A	ppm	0.0002	0	0.0459	6.7400	0	76
Yb	ALS Canada	VEG41a-FAC	VEGF	A	ppm	0.0002	0	0.0036	0.5610	0	76
Zn	ALS Canada	VEG41a-FAC	VEGF	A	ppm	0.005	0	5.670	81.500	0	76
Zr	ALS Canada	VEG41a-FAC	VEGF	A	ppm	0.001	0	0.008	1.860	0	76

APPENDICES

Appendix A is included in the OF_013A_0125 zip folder as a digital comma-separated value file (.csv) and Appendix B as a pdf.

APPENDIX A: Humus Data from ALS Canada Ltd.

APPENDIX B: ALS Canada Ltd. 2023 Geochemistry Schedule of Fees and Services