

STANDARD SOIL REFERENCE MATERIAL FOR Au-REE DEPOSITS

25 May 2020

UpDeep_ORG_Ah1

KAVA Reference: 16329, UpDeep, Upscaling deep buried geochemical exploration techniques into European business

Name of the authors/Responsible partners: Anne Taivalkoski, Antti Taskinen, Tero Korhonen, Maarit Middleton/Geological Survey of Finland, Jens Rönnqvist/Scandinavian GeoPool, Dominika Miksova/Vienna University of Technology

Content

1. INTRODUCTION	3
2. SOURCE MATERIALS.....	3
3. COMMINATION AND HOMOGENISATION PROCEDURES	3
4. ANALYTICAL PROGRAM.....	4
5. STATISTICAL ANALYSIS	4
6. PARTICIPANT LABORATORIES	5
ALS, Vancouver, Canada	5
Bureau Veritas Minerals Acmelabs, Vancouver, Canada	7
7. PREPARER ANS SUPPLIER.....	11
8. INTENDED USE.....	12
9. STABILITY AND STORAGE INSTRUCTIONS	12
10. INSTRUCTIONS FOR CORRECT USE.....	12
11. HANDLING INSTRUCTIONS.....	12
12. TRACEABILITY.....	12
13. LEGAL NOTICE.....	13
14. REFERENCES	13

1. INTRODUCTION

UpDeep standard reference materials (SRM) are intended to be used in weak leach (i.e. geochemical) analysis for providing an affordable method of controlling the quality of soil samples for mineral exploration purposes. SRMs are produced less rigorously compared to e.g. certified reference materials. The UpDeep SRM samples do not follow the ISO standardization and are therefore not certified reference materials (CRM). However, the UpDeep standard reference materials are more affordable and can thus be inserted in the analysis sequence more frequently than CRMs. For the user of the UpDeep SRMs, the purpose is to quantify laboratory accuracy externally in the form of bias.

2. SOURCE MATERIALS

UpDeep_ORG_Ah1 is mineral soil material collected from B-horizon on the Au-REE bearing quartz-hematite vein in the Mäkärä exploration target, northern Finland, in 2017.

UpDeep_ORG_Ah1 is one of six reference materials (Ah- and B-horizon, common juniper foliage, Scots pine bark, Norway spruce bark and foliage) collected from the Mäkärä exploration target in the UpDeep project.

3. COMMINUTION AND HOMOGENISATION PROCEDURES

The UpDeep_ORG_Ah1 SRM was prepared as follows:

- homogenization of the bulk Ah horizon sample in the field
- dividing and packaging in 120 g units ziplog plastic bags
- drying at 40°C for two days and in the laboratory 2, drying at 60°C
- sieving in the laboratory 1: - 180 µm and in the laboratory 2: -80 mesh (-177 µm)

4. ANALYTICAL PROGRAM

UpDeep_ORG_Ah1 SRM samples were analyzed in two geochemical laboratories

- ALS Minerals/ALS Global (Vancouver, Canada through, ALS, Sodankylä, Finland, laboratory 1)
- Bureau Veritas Minerals Acmelabs (BVAcmeLabs, Shaughnessy St., Vancouver, BC, Canada, laboratory 2)

The methods used were:

- super trace modified weak aqua regia by ICP-MS with REE add-on (method code ME-MS41WREE, ALS Minerals/ALS Global)
- 1:1:1 aqua regia digestion Ultratrace by ICP-MS (method code AQ250-EXT+REE, Bureau Veritas Minerals Acmelabs), sample size 0.5 g
- partial leach with 0.1 M sodium pyrophosphate by ICP-MS (method code LH103, Bureau Veritas Minerals Acmelabs), sample size 1 g
- LOI by loss of ignition (Bureau Veritas Minerals Acmelabs)

Ten UpDeep_ORG_Ah1 SRM aliquots were sent to the both of the laboratories. Tables 1-3 (Chapter 6) present information values for the laboratory results. The RSD% values < 5 are marked as green, the $5 \leq \text{RSD}\% \leq 15$ are marked with orange and the $\text{RSD}\% > 15$ are marked with red. Elements having less than four observations between the detection limits are coloured gray.

5. STATISTICAL ANALYSIS

Analysed elements, units, lower (LDL) and upper detection limits (UDL), percentage of <LDL, >UDL and discretized values, mean, median, standard deviation (SD), relative standard deviation (RSD%) and median absolute deviation (MAD) are presented in Chapter 6.

Original data, quality control monitoring and statistical measures are available upon request.

6. PARTICIPANT LABORATORIES

ALS, Vancouver, Canada

Table 1. Statistics for UpDeep_ORG_Ah1 analysed with super trace modified weak aqua regia method by ICP-MS with REE add-on (method code ME-MS41W-REE), based on ten aliquots. LDL = lower detection limit, pct_LDL = percent of samples under lower detection limit, UDL = upper detection limit, pct_UDL = percent of samples over upper detection limit, pct_discr = percent of discretized values, SD = standard deviation, RSD% = relative standard deviation percent and MAD= median absolute deviation. The RSD% values < 5 are marked as green, the 5 ≤ RSD% ≤ 15 are marked with orange and the RSD% > 15 are marked with red. Elements having less than four observations between the detection limits are coloured gray.

Element	unit	LDL	pct_LDL	UDL	pct_UDL	pct_discr	MEAN	MEDIAN	SD	RSD %	MAD
Ag	ppm	NA	0	NA	0	0	0.1679	0.165	0.0116	6.9281	0.0111
Al	%	NA	0	NA	0	62.5	0.3125	0.3	0.0175	5.6082	0
As	ppm	NA	0	NA	0	0	0.86	0.85	0.0756	8.7899	0.0741
Au	ppm	NA	0	NA	0	0	0.0028	0.0017	0.003	105.4138	0.001
B	ppm	10	100	NA	0	100	7.5	7.5	0	NA	0
Ba	ppm	NA	0	NA	0	0	75.3	74.4	3.3823	4.4918	1.9274
Be	ppm	NA	0	NA	0	75	0.1413	0.14	0.0136	9.6014	0.0148
Bi	ppm	NA	0	NA	0	0	0.1498	0.147	0.0072	4.7856	0.003
Ca	%	NA	0	NA	0	100	0.05	0.05	0	NA	0
Cd	ppm	NA	0	NA	0	0	0.2642	0.265	0.0147	5.5755	0.0156
Ce	ppm	NA	0	NA	0	0	6.5475	6.285	0.5124	7.8256	0.2743
Co	ppm	NA	0	NA	0	0	1.069	1.055	0.1494	13.9746	0.1475
Cr	ppm	NA	0	NA	0	0	6.8688	6.585	0.7022	10.2233	0.4893
Cs	ppm	NA	0	NA	0	0	0.1069	0.106	0.0095	8.8545	0.0119
Cu	ppm	NA	0	NA	0	0	10.2513	9.835	0.9867	9.6249	0.7561
Dy	ppm	NA	0	NA	0	0	0.5591	0.537	0.0615	11.0054	0.0319
Er	ppm	NA	0	NA	0	0	0.31	0.304	0.0255	8.2387	0.0185
Eu	ppm	NA	0	NA	0	0	0.0982	0.097	0.0074	7.4942	0.0082
Fe	%	NA	0	NA	0	0	0.4675	0.455	0.0392	8.3825	0.0371
Ga	ppm	NA	0	NA	0	0	1.9637	1.905	0.1765	8.9904	0.152
Gd	ppm	NA	0	NA	0	0	0.5024	0.49	0.0428	8.5172	0.0415

Ge	ppm	NA	0	NA	0	0	0.0565	0.0485	0.0278	49.2223	0.0111
Hf	ppm	NA	0	NA	0	0	0.0099	0.008	0.0056	56.8836	0.003
Hg	ppm	NA	0	NA	0	0	0.115	0.113	0.0081	7.0491	0.0082
Ho	ppm	NA	0	NA	0	0	0.11	0.107	0.0132	12.0212	0.0082
In	ppm	NA	0	NA	0	37.5	0.0173	0.017	0.001	6.0006	0.0015
K	%	NA	0	NA	0	100	0.03	0.03	0	NA	0
La	ppm	NA	0	NA	0	0	4.1725	4.04	0.3125	7.4904	0.2372
Li	ppm	NA	0	NA	0	75	0.3	0.3	0.1069	35.6348	0.1483
Lu	ppm	NA	0	NA	0	37.5	0.0294	0.0285	0.003	10.2834	0.001
Mg	%	NA	0	NA	0	100	0.015	0.015	0.0053	35.6348	0.0074
Mn	ppm	NA	0	NA	0	0	51.7125	46.75	11.6737	22.5743	1.4826
Mo	ppm	NA	0	NA	0	0	0.1988	0.2	0.0236	11.8571	0.0148
Na	%	NA	0	NA	0	75	0.0018	0.002	0.001	26.452	0
Nb	ppm	NA	0	NA	0	0	0.4945	0.327	0.3897	78.8117	0.0534
Nd	ppm	NA	0	NA	0	0	3.315	3.255	0.2412	7.2774	0.1853
Ni	ppm	NA	0	NA	0	0	6.4363	6.34	0.5488	8.5261	0.7561
P	%	NA	0	NA	0	0	0.0701	0.0695	0.005	7.0867	0.0037
Pb	ppm	NA	0	NA	0	0	23.7625	23.6	1.0211	4.2972	1.2602
Pd	ppm	0.001	87.5	NA	0	87.5	0.001	0.001	0.000	11.3137	0
Pr	ppm	NA	0	NA	0	0	0.8518	0.825	0.0608	7.1376	0.0452
Pt	ppm	0.002	100	NA	0	100	0.0015	0.0015	0	NA	0
Rb	ppm	NA	0	NA	0	0	2.635	2.525	0.2683	10.1832	0.1112
Re	ppm	0.001	100	NA	0	100	0.001	0.001	0	NA	0
S	%	NA	0	NA	0	100	0.045	0.045	0.0053	11.8783	0.0074
Sb	ppm	NA	0	NA	0	0	0.1369	0.1345	0.0114	8.3157	0.0082
Sc	ppm	NA	0	NA	0	0	1.1889	1.005	0.5095	42.8572	0.1646
Se	ppm	NA	0	NA	0	87.5	0.8625	0.85	0.0744	8.6264	0.0741
Sm	ppm	NA	0	NA	0	0	0.534	0.5265	0.0469	8.7875	0.0526
Sn	ppm	NA	0	NA	0	0	0.8612	0.825	0.0775	9.0032	0.0371
Sr	ppm	NA	0	NA	0	0	6.4837	6.435	0.2463	3.7994	0.2372
Ta	ppm	NA	0	NA	0	0	0.0136	0.01	0.0083	61.2729	0.0044
Tb	ppm	NA	0	NA	0	0	0.0846	0.0815	0.0069	8.1365	0.0052
Te	ppm	NA	0	NA	0	87.5	0.0175	0.02	0.0071	40.4061	0.0074
Th	ppm	NA	0	NA	0	0	0.1114	0.094	0.0568	50.972	0.0259
Ti	%	NA	0	NA	0	87.5	0.0066	0.0065	0.001	11.2305	0.001
Tl	ppm	NA	0	NA	0	0	0.0228	0.0225	0.0024	10.4416	0.0015
Tm	ppm	NA	0	NA	0	0	0.0388	0.038	0.003	7.6492	0.003

U	ppm	NA	0	NA	0	0	0.2988	0.2955	0.0219	7.3177	0.017
V	ppm	NA	0	NA	0	0	10.6125	10.05	1.1993	11.3011	0.6672
W	ppm	NA	0	NA	0	0	0.0382	0.036	0.01	26.0221	0.0089
Y	ppm	NA	0	NA	0	0	2.9725	2.925	0.2401	8.0775	0.1557
Yb	ppm	NA	0	NA	0	0	0.2255	0.2225	0.0224	9.9132	0.0185
Zn	ppm	NA	0	NA	0	0	24.125	23.65	1.2612	5.2279	0.7413
Zr	ppm	NA	0	NA	0	37.5	0.635	0.32	0.6177	97.2815	0.1408

Bureau Veritas Minerals Acmelabs, Vancouver, Canada

Table 2. Statistics for UpDeep_ORG_Ah1 analysed with 1:1:1 aqua regia digestion Ultratrace by ICP-MS (method code AQ250-EXT+REE), based on ten aliquots. LDL = lower detection limit, pct_LDL = percent of samples under lower detection limit, UDL = upper detection limit, pct_UDL = percent of samples over upper detection limit, pct_discr = percent of discretized values, SD = standard deviation, RSD% = relative standard deviation percent and MAD= median absolute deviation. The RSD% values < 5 are marked as green, the 5 ≤ RSD% ≤ 15 are marked with orange and the RSD% > 15 are marked with red. Elements having less than four observations between the detection limits are coloured gray.

Element	unit	LDL	pct_LDL	UDL	pct_UDL	pct_discr	MEAN	MEDIAN	SD	RSD %	MAD
Ag	ppb	2	0	NA	0	0	201	197	14.4123	7.1703	17.7912
Al	%	0.01	0	NA	0	50	0.3988	0.395	0.0113	2.8238	0.0074
As	ppm	0.1	0	NA	0	87.5	0.775	0.8	0.0707	9.124	0.0741
Au	ppb	0.2	37.5	NA	0	37.5	25.7688	0.55	70.5291	NA	0.593
B	ppm	20	100	NA	0	100	15	15	0	NA	0
Ba	ppm	0.5	0	NA	0	0	93.525	92.75	4.0202	4.2985	4.1513
Be	ppm	0.1	25	NA	0	50	0.1188	0.1	0.0513	43.2184	0.0185
Bi	ppm	0.02	0	NA	0	0	0.2162	0.22	0.0277	12.8289	0.0445
Ca	%	0.01	0	NA	0	75	0.0725	0.07	0.0046	6.385	0
Cd	ppm	0.01	0	NA	0	37.5	0.3475	0.35	0.0139	3.9963	0.0148
Ce	ppm	0.1	0	NA	0	37.5	9.825	10	0.5625	5.7254	0.2224
Co	ppm	0.1	0	NA	0	62.5	1.3875	1.4	0.0641	4.6189	0
Cr	ppm	0.5	0	NA	0	0	8.4875	8.5	0.4673	5.506	0.2965
Cs	ppm	0.02	0	NA	0	75	0.1413	0.14	0.0083	5.9081	0.0148
Cu	ppm	0.01	0	NA	0	0	12.4238	12.39	0.9372	7.5436	0.8228

Dy	ppm	0.02	0	NA	0	0	0.7212	0.725	0.0376	5.2108	0.0371
Er	ppm	0.02	0	NA	0	0	0.3938	0.395	0.0385	9.7833	0.0222
Eu	ppm	0.02	0	NA	0	87.5	0.1438	0.145	0.0074	5.1758	0.0074
Fe	%	0.01	0	NA	0	37.5	0.5562	0.555	0.0106	1.9068	0.0074
Ga	ppm	0.1	0	NA	0	37.5	2.275	2.25	0.1282	5.634	0.0741
Gd	ppm	0.02	0	NA	0	0	0.7163	0.725	0.0737	10.2851	0.0815
Ge	ppm	0.1	100	NA	0	100	0.075	0.075	0	NA	0
Hf	ppm	0.02	100	NA	0	100	0.015	0.015	0	NA	0
Hg	ppb	5	0	NA	0	0	126.875	129	9.078	7.1551	11.1195
Ho	ppm	0.02	0	NA	0	37.5	0.1388	0.14	0.0125	8.9832	0.0148
In	ppm	0.02	12.5	NA	0	75	0.0219	0.02	0.0075	34.4215	0
K	%	0.01	0	NA	0	100	0.04	0.04	0	NA	0
La	ppm	0.5	0	NA	0	37.5	6.175	6.3	0.3615	5.855	0.2224
Li	ppm	0.1	0	NA	0	75	0.3	0.3	0.0535	17.8174	0
Lu	ppm	0.02	0	NA	0	100	0.0338	0.03	0.0052	15.3348	0
Mg	%	0.01	0	NA	0	87.5	0.0288	0.03	0.0035	12.2975	0
Mn	ppm	1	0	NA	0	0	65.875	66	4.9982	7.5874	6.6717
Mo	ppm	0.01	0	NA	0	50	0.1812	0.19	0.0196	10.8105	0.0148
Na	%	0.001	0	NA	0	87.5	0.0031	0.003	0.000	11.3137	0
Nb	ppm	0.02	0	NA	0	0	0.3575	0.36	0.0249	6.973	0.0222
Nd	ppm	0.02	0	NA	0	0	5.0613	5.135	0.3682	7.2745	0.1408
Ni	ppm	0.1	0	NA	0	0	7.8875	7.85	0.2642	3.3501	0.2965
P	%	0.001	0	NA	0	0	0.0696	0.069	0.0063	9.0492	0.0059
Pb	ppm	0.01	0	NA	0	0	29.3475	29.735	1.3165	4.486	0.6449
Pd	ppb	10	100	NA	0	100	7.5	7.5	0	NA	0
Pr	ppm	0.02	0	NA	0	0	1.375	1.37	0.0949	6.8995	0.0667
Pt	ppb	2	87.5	NA	0	87.5	1.5625	1.5	0.1768	11.3137	0
Rb	ppm	0.1	0	NA	0	75	2.975	2.95	0.1165	3.9158	0.1483
Re	ppb	1	100	NA	0	100	0.75	0.75	0	NA	0
S	%	0.02	0	NA	0	100	0.0662	0.07	0.0052	7.8121	0
Sb	ppm	0.02	0	NA	0	37.5	0.155	0.15	0.0141	9.124	0.0148
Sc	ppm	0.1	0	NA	0	87.5	0.3125	0.3	0.0354	11.3137	0
Se	ppm	0.1	0	NA	0	75	0.275	0.3	0.0463	16.8331	0
Sm	ppm	0.02	0	NA	0	0	0.8925	0.89	0.0399	4.4718	0.0297
Sn	ppm	0.1	0	NA	0	87.5	0.975	1	0.0707	7.2524	0.0741
Sr	ppm	0.5	0	NA	0	0	8.45	8.3	0.3964	4.6913	0.3707
Ta	ppm	0.05	100	NA	0	100	0.0375	0.0375	0	NA	0

Tb	ppm	0.02	0	NA	0	87.5	0.1212	0.12	0.0099	8.1735	0.0074
Te	ppm	0.02	100	NA	0	100	0.015	0.015	0	NA	0
Th	ppm	0.1	100	NA	0	100	0.075	0.075	0	NA	0
Ti	%	0.001	0	NA	0	50	0.0054	0.005	0.001	17.0442	0.001
Tl	ppm	0.02	12.5	NA	0	75	0.0294	0.03	0.0068	23.0843	0
Tm	ppm	0.02	0	NA	0	87.5	0.0525	0.05	0.0071	13.4687	0.0074
U	ppm	0.1	0	NA	0	100	0.3375	0.3	0.0518	15.3348	0
V	ppm	2	0	NA	0	62.5	12.125	12	0.6409	5.2855	0
W	ppm	0.1	100	NA	0	100	0.075	0.075	0	NA	0
Y	ppm	0.01	0	NA	0	0	3.5725	3.575	0.2246	6.2872	0.2817
Yb	ppm	0.02	0	NA	0	0	0.3362	0.335	0.0277	8.2505	0.0297
Zn	ppm	0.1	0	NA	0	0	32.3875	32.05	1.516	4.681	2.0015
Zr	ppm	0.1	100	NA	0	100	0.075	0.075	0	NA	0

Table 3. Statistics for UpDeep_ORG_Ah1 analysed with 0.1 M sodium pyrophosphate by ICP-MS (method code LH103), based on ten aliquots. LDL = lower detection limit, pct_LDL = percent of samples under lower detection limit, UDL = upper detection limit, pct_UDL = percent of samples over upper detection limit, pct_discr = percent of discretized values, SD = standard deviation, RSD% = relative standard deviation percent and MAD= median absolute deviation. The RSD% values < 5 are marked as green, the 5 ≤ RSD% ≤ 15 are marked with orange and the RSD% > 15 are marked with red. Elements having less than four observations between the detection limits are coloured gray.

Element	unit	LDL	pct_LDL	UDL	pct_UDL	pct_discr	MEAN	MEDIAN	SD	RSD %	MAD
Ag	ppb	3	0	NA	0	0	32.625	30	6.9269	21.2319	4.4478
Al	ppm	1	0	NA	0	0	1693.5	1682.5	79.5272	4.696	68.9409
As	ppb	100	0	NA	0	0	465	458.5	36.7346	7.8999	9.6369
Au	ppb	1	87.5	NA	0	87.5	0.9062	0.75	0.4419	48.766	0
Ba	ppb	50	0	NA	0	0	18870.38	18956.5	940.237	4.9826	522.6165
Be	ppb	20	0	NA	0	0	71.5	74.5	8.1591	11.4114	6.6717
Bi	ppb	5	0	NA	0	0	61.75	61.5	4.7132	7.6327	6.6717
Ca	ppm	5	0	NA	0	0	293.25	290	22.1601	7.5567	18.5325
Cd	ppb	20	0	NA	0	0	147.125	147.5	12.2526	8.328	13.3434
Ce	ppb	5	0	NA	0	0	3247.25	3186.5	171.722	5.2882	48.9258
Co	ppb	20	0	NA	0	0	445.625	447.5	18.0312	4.0463	19.2738
Cs	ppb	5	100	NA	0	100	3.75	3.75	0	NA	0
Cu	ppb	20	0	NA	0	0	5143.875	4905	595.722	11.5812	378.8043

Dy	ppb	5	0	NA	0	0	375.25	373	35.7881	9.5371	45.9606
Er	ppb	5	0	NA	0	0	215.25	210	14.6067	6.7859	10.3782
Eu	ppb	5	0	NA	0	0	69.25	67	4.6214	6.6735	2.9652
Fe	ppm	5	0	NA	0	0	2513.125	2470	87.3849	3.4771	40.0302
Ga	ppb	50	0	NA	0	0	269.125	269	20.6012	7.6549	26.6868
Gd	ppb	5	0	NA	0	0	331.25	329.5	20.098	6.0673	25.2042
Ge	ppb	50	100	NA	0	100	37.5	37.5	0	NA	0
Hf	ppb	20	0	NA	0	37.5	24.75	24	1.9821	8.0083	1.4826
Hg	ppb	5	37.5	NA	0	37.5	6.2812	5	3.0602	48.7199	1.8532
Ho	ppb	20	0	NA	0	0	77.25	76	6.7348	8.7182	4.4478
In	ppb	10	12.5	NA	0	37.5	12.3125	12	2.6314	21.3715	2.9652
K	ppm	5	0	NA	0	0	193.75	194.5	3.8079	1.9654	4.4478
La	ppb	5	0	NA	0	0	2210.75	2179.5	135.368	6.1232	117.1254
Li	ppb	20	50	NA	0	50	19	18.5	4.3095	22.6814	5.1891
Lu	ppb	5	0	NA	0	0	24	24.5	2.5071	10.4464	2.2239
Mg	ppm	1	0	NA	0	0	109.25	110	4.8329	4.4237	5.1891
Mn	ppb	50	0	NA	0	0	43101.13	43562.5	3626.344	8.4136	3390.7062
Mo	ppb	10	0	NA	0	0	65.375	66.5	11.2369	17.1884	8.8956
Nb	ppb	10	0	NA	0	0	220.75	207.5	25.195	11.4133	12.6021
Nd	ppb	5	0	NA	0	0	1890.88	1883	141.175	7.4661	110.4537
Ni	ppb	50	0	NA	0	0	2192.38	2157.5	142.712	6.5095	106.0059
Pb	ppb	20	0	NA	0	0	7264.63	7228.5	234.646	3.23	116.3841
Pr	ppb	5	0	NA	0	0	516.125	518.5	24.8276	4.8104	25.9455
Rb	ppb	5	0	NA	0	0	438.25	440.5	24.2708	5.5381	24.4629
Re	ppb	2	100	NA	0	100	1.5	1.5	0	NA	0
Sb	ppb	5	25	NA	0	0	7.9375	8	3.2092	40.4311	2.9652
Sc	ppb	100	0	NA	0	0	1272.5	1264	79.1653	6.2212	103.782
Se	ppb	200	100	NA	0	100	150	150	0	NA	0
Sm	ppb	5	0	NA	0	0	364.625	361.5	17.9518	4.9234	20.0151
Sn	ppb	20	0	NA	0	0	332.25	326.5	31.3038	9.4218	15.5673
Sr	ppb	20	0	NA	0	0	1801.75	1808.5	94.8499	5.2643	87.4734
Ta	ppb	20	100	NA	0	100	15	15	0	NA	0
Tb	ppb	5	0	NA	0	0	57.25	56.5	4.6828	8.1796	4.4478
Te	ppb	20	100	NA	0	100	15	15	0	NA	0
Th	ppb	20	0	NA	0	0	783.875	754.5	67.7926	8.6484	42.2541
Ti	ppm	1	100	NA	0	100	0.75	0.75	0	NA	0
Tl	ppb	5	100	NA	0	100	3.75	3.75	0	NA	0

Tm	ppb	5	0	NA	0	37.5	32.5	32	2.6726	8.2234	1.4826
U	ppb	5	0	NA	0	37.5	136.63	134.5	8.158	5.9711	4.4478
V	ppb	50	0	NA	0	0	1938.38	1933.5	198.370	10.2338	110.4537
W	ppb	10	0	NA	0	0	20.625	21.5	2.3261	11.278	2.2239
Y	ppb	5	0	NA	0	0	2020.13	2007	116.572	5.7705	132.6927
Yb	ppb	5	0	NA	0	0	193.125	185	20.7739	10.7567	17.0499
Zn	ppb	100	0	NA	0	0	14505	14598.5	604.911	4.1704	857.6841
Zr	ppb	20	0	NA	0	0	1311.63	1276.5	90.5317	6.9023	86.7321

7. PREPARER ANS SUPPLIER

UpDeep_ORG_Ah1 SRMs are prepared by the Geological Survey of Finland (GTK) in a project Upscaling deep buried geochemical exploration techniques into European business (UpDeep) and supplied by GTK and Scandinavian Geopool.

Contact information:

Ab Scandinavian GeoPool Ltd, Merilokinkaari 15a, 67200 KOKKOLA, Finland,
jens.rönnqvist(at)geopool.fi, tel. +358 50 337 7116.

Geological Survey of Finland, Mintec, Tutkijankatu 1, 83500 OUTOKUMPU, Finland,
antti.taskinen(at)gtk.fi, tero.korhonen(at)gtk.fi, anne.taivalkoski(at)gtk.fi (+358 29 5034264),
pertti.sarala(at)gtk.fi

This activity has received funding from the European Institute of Innovation and Technology (EIT), a body of the European Union, under the Horizon 2020, the EU Framework Programme for Research and Innovation.

8. INTENDED USE

UpDeep_ORG_Ah1 SRMs are intended to quantify laboratory accuracy and to monitor laboratory precision, drift, periodic concentration shifts, unusual breaks and outliers in analytical results of soil Ah horizon samples for mineral exploration.

9. STABILITY AND STORAGE INSTRUCTIONS

UpDeep_ORG_Ah1 SRM should be stored in a room temperature unopened in their own plastic containers. Stability of the materials are not tested.

10. INSTRUCTIONS FOR CORRECT USE

UpDeep_ORG_Ah1 SRM is a dry sample, but needs to be sieved to a requisite size prior to analysis. It should be only used with samples of same matrix and concentration ranges.

11. HANDLING INSTRUCTIONS

Keep dry and do not touch with bare hands to avoid SRM contamination.

12. TRACEABILITY

The analyzed SRM samples represent the entire batch of prepared SRM. All the analyzed samples have individual names and can be traced back into the original analytical results. The laboratories

were chosen on the basis the availability of the analytical services specific to soils and offered range of elements usable for mineral exploration. The laboratories have ISO/IEC 17025:2005 accreditation (ALS Minerals/ALS Global), Quality ISO9001:2008, Environmental Management: ISO14001, Safety Management OH SAS 18001 and AS4801 certificates (Bureau Veritas Minerals Acmelabs).

13. LEGAL NOTICE

Geological Survey of Finland and Scandinavian Geopool have prepared and Geological Survey of Finland and Vienna Technical University have statistically evaluated the property values of this reference material to the best of their ability. Geological Survey of Finland, Scandinavian Geopool and Vienna Technical University assume no liability for any errors in this material and information. Geological Survey of Finland, Scandinavian Geopool and Vienna Technical University shall be free from, and indemnified by the user against, any liability for any damage or loss, whether direct or consequential, arising from or as a result of the use of this material and information.

14. REFERENCES

Reimann, C., Filzmoser, P., Garrett, R. & Dutter, R. 2008. Statistical data analysis explained: applied environmental statistics with R. John Wiley & Sons Ltd, England. 343 p.