

Appendix 4: Biogeochemistry – humus

Laboratory methodology

MS Excel Humus sample database

MS Excel results from laboratory (digital only)

Assay certificate from laboratory

Contoured maps of As, Ba, Bi+Te, Co, Cr, Cu, Ni, Ni/Cu, PGE+Au and Sb distribution

2E -Vegetation Ash for Au, Pt, Pd - ICP/MS

Samples are ashed at low temperature in dedicated ovens at 475 ° C for 24 hours. 0.25 g of ash is digested in aqua regia at 95 ° C for 2 hours. Digested ash samples are diluted and analyzed by Perkin Elmer Sciex ELAN 6000, 6100 or 9000 ICP/MS. A blank is run every 69 samples. Two digested controls are analyzed every 69 samples. Duplicates are digested and analyzed every 14 samples. Instrument is recalibrated every 69 samples. Results are reported on an ash weight basis. On request results can be computed on a dry weight basis.

Preparation code B3 - dry and ash at 475°C in dedicated vegetation kilns is required.

Code 2E Elements and Detection Limits (ppm)

Element	Detection Limit
Ag	0.2
Al	2
As	3
Au	2 ppb
B	5
Ba	3
Be	0.08
Bi	0.05
Ca	0.1%
Cd	0.01%
Ce	0.01
Co	0.01%
Cr	10
Cs	0.001
Cu	0.2
Dy	0.001

Element	Detection Limit
Er	0.001
Eu	0.001
Fe	0.01%
Ga	0.1
Gd	0.01
Ge	0.1
Hf	0.01
Ho	0.001
In	1 ppb
K	0.01%
La	0.002
Li	0.5
Lu	0.001
Mg	0.01%
Mn	0.1
Mo	0.1

Element	Detection Limit
Na	0.01%
Nb	0.005
Nd	0.002
Ni	5
Pb	0.1
Pd	3 ppb
Pr	0.002
Pt	2 ppb
Rb	0.01
Re	0.1 ppb
Ru	10 ppb
Sb	0.02
Sc	0.5
Se	10
Si	0.2%
Sm	0.001

Element	Detection Limit
Sn	1
Sr	0.1
Ta	0.001
Tb	0.001
Te	0.01
Ti	1
Tl	0.001
Th	0.001
Tm	0.001
U	0.001
V	10
W	0.5
Y	0.001
Yb	0.001
Zn	1
Zr	0.5

Quality Analysis ...



Innovative Technologies

Date Submitted: 05-Sep-13
Invoice No.: A13-10754
Invoice Date: 24-Sep-13
Your Reference: ARCH

**Midnight Mining Services
27A MacDonald Road
Box 31347
Whitehorse YT Y1A 5P7
Canada**

ATTN: Debbie James

CERTIFICATE OF ANALYSIS

77 Humus samples were submitted for analysis.

The following analytical package was requested:

Code 2E Aqua Regia Digestion ICP/MS

REPORT A13-10754

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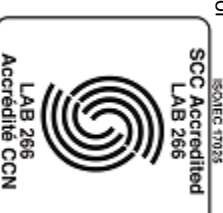
Notes:

CERTIFIED BY :

A handwritten signature in black ink, appearing to read "Emmanuel Eseme".

Emmanuel Eseme, Ph.D.

Quality Control



ACTIVATION LABORATORIES LTD.

1336 Sandhill Drive, Ancaster, Ontario Canada L9G 4V5 TELEPHONE +1 905 648 9611 or
+1 888 228 5227 FAX +1 905 648 9613
E-MAIL: Ancaster@actlabs.com ACTLABS GROUP WEBSITE www.actlabs.com

TM

Activation Laboratories Ltd. Report: A13-10754

Analyte Symbol	Li	Be	B	Na	Mg	Al	Si	K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Rb
Unit Symbol	ppm	ppm	ppm	%	%	ppm	%	%	%	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Detection Limit	0.5	0.08	5	0.01	0.01	2	0.2	0.01	0.1	0.5	1	10	10	0.1	0.01	0.01	5	0.2	1	0.1	0.1	3	10	0.01
Analysis Method	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS
H10000	10.1	0.51	10	0.04	0.88	> 10000	< 0.2	0.09	2.0	5.3	711	50	30	934	2.90	14.4	44	40.3	110	5.2	0.1	12	< 10	9.14
H10050	7.3	0.34	8	0.05	0.86	> 10000	< 0.2	0.13	0.9	4.8	629	50	10	394	2.88	13.1	42	26.8	77	5.1	< 0.1	8	< 10	7.16
H10100	7.1	0.34	9	0.05	0.82	> 10000	< 0.2	0.13	1.5	5.3	732	70	20	270	2.78	12.3	37	24.7	72	5.4	< 0.1	8	< 10	14.0
H10150	8.8	0.39	10	0.06	1.09	> 10000	< 0.2	0.15	1.8	6.0	751	60	30	377	2.89	15.1	43	30.0	96	5.5	0.1	8	< 10	12.3
H10200	8.5	0.30	13	0.06	0.96	> 10000	< 0.2	0.17	1.7	4.9	708	50	20	490	2.72	13.5	42	33.7	88	4.8	0.1	6	< 10	15.6
H10250	9.3	0.50	6	0.04	0.94	> 10000	< 0.2	0.11	1.3	5.7	702	50	20	930	3.23	17.9	53	32.7	133	5.5	0.1	8	< 10	11.0
H10350	8.5	0.34	10	0.05	0.98	> 10000	< 0.2	0.14	1.5	5.7	775	60	30	356	3.10	14.3	49	37.9	70	5.1	0.1	8	< 10	8.59
H10400	11.4	0.35	15	0.05	1.31	> 10000	< 0.2	0.19	2.5	5.7	688	50	40	727	3.27	19.8	88	43.0	95	5.3	0.1	10	< 10	31.4
H10450	10.1	0.44	11	0.05	1.21	> 10000	< 0.2	0.12	1.1	5.8	685	50	40	466	3.43	20.1	99	38.6	90	5.7	0.1	6	< 10	11.8
H10500	9.3	0.25	11	0.04	1.66	> 10000	< 0.2	0.15	1.7	5.0	553	50	50	347	3.16	18.3	104	43.7	59	4.8	0.1	7	< 10	7.62
H10550	7.2	0.32	7	0.03	0.71	> 10000	< 0.2	0.07	1.0	4.4	619	50	20	197	2.48	10.7	40	22.8	53	5.0	0.1	6	< 10	5.21
H10600	9.9	0.43	14	0.04	0.98	> 10000	< 0.2	0.13	2.2	5.7	687	50	30	753	3.09	15.9	53	37.9	166	5.3	0.1	12	< 10	14.6
H10650	8.2	0.37	14	0.04	0.71	> 10000	< 0.2	0.12	3.6	5.0	650	40	< 10	206	2.43	8.06	44	32.1	70	4.8	< 0.1	10	< 10	10.3
H10700	11.9	0.41	20	0.06	1.24	> 10000	< 0.2	0.16	3.4	7.4	760	60	30	634	3.20	18.8	63	45.3	105	6.0	0.1	11	< 10	12.8
H10800A	13.6	0.48	17	0.06	1.37	> 10000	< 0.2	0.13	2.8	8.1	850	70	30	676	3.47	21.7	63	53.7	121	6.5	0.1	8	< 10	7.22
H10800	12.8	0.42	15	0.05	1.42	> 10000	< 0.2	0.11	2.3	7.8	884	70	30	600	3.45	19.9	63	53.0	108	6.2	0.1	7	< 10	6.36
H12000	8.1	0.45	6	0.05	0.81	> 10000	< 0.2	0.15	0.8	5.9	694	60	20	523	3.23	16.5	50	33.6	80	5.8	< 0.1	4	< 10	9.58
H12050	8.5	0.38	13	0.07	0.80	> 10000	< 0.2	0.28	1.4	6.1	649	50	20	376	3.16	16.6	46	31.8	72	5.4	0.1	7	< 10	10.5
H12100	12.6	0.38	16	0.07	2.08	> 10000	< 0.2	0.22	1.1	8.9	721	100	100	670	4.17	25.3	67	60.4	95	7.6	0.1	8	< 10	9.80
H12200	7.4	0.38	9	0.05	0.78	> 10000	< 0.2	0.13	1.4	5.0	594	50	10	621	2.75	14.8	37	31.1	113	5.2	< 0.1	6	< 10	10.7
H12250	12.1	0.40	10	0.05	1.25	> 10000	< 0.2	0.13	2.2	8.3	668	50	40	562	2.84	17.2	53	52.9	88	5.9	< 0.1	3	< 10	9.70
H12300	11.2	0.46	10	0.06	1.36	> 10000	< 0.2	0.16	2.1	8.1	680	70	50	523	3.22	17.7	57	44.6	97	6.4	0.1	9	< 10	10.3
H12350	10.9	0.37	17	0.05	1.19	> 10000	< 0.2	0.28	2.4	5.6	618	50	30	601	3.10	15.6	49	38.9	126	5.1	< 0.1	7	< 10	18.2
H12400	11.4	0.33	11	0.05	0.98	> 10000	< 0.2	0.21	2.1	5.0	663	50	10	499	2.88	13.5	44	34.6	161	5.1	0.1	7	< 10	10.9
H12450	10.3	0.42	13	0.05	1.01	> 10000	< 0.2	0.17	2.7	6.4	733	50	20	574	2.97	16.2	50	38.3	121	5.5	0.1	8	< 10	15.2
H12500	9.4	0.36	9	0.05	0.87	> 10000	< 0.2	0.18	1.1	5.2	783	50	10	358	2.77	13.2	41	27.5	88	4.9	0.1	4	< 10	13.1
H12550	10.2	0.32	14	0.05	0.91	> 10000	< 0.2	0.17	2.3	4.8	683	40	< 10	548	2.65	13.2	40	33.0	107	4.8	0.1	5	< 10	18.1
H12600	12.8	0.36	34	0.07	1.34	> 10000	< 0.2	0.49	4.4	6.1	760	60	30	863	3.18	16.8	55	54.4	97	5.4	0.1	13	< 10	18.3
H12650	12.2	0.37	13	0.05	1.09	> 10000	< 0.2	0.16	2.0	6.0	712	50	10	504	3.15	15.2	49	30.4	108	5.5	0.1	9	< 10	10.7
H12750	10.8	0.43	9	0.05	0.99	> 10000	< 0.2	0.16	1.4	6.2	633	50	< 10	439	2.94	16.0	48	32.8	73	5.7	< 0.1	4	< 10	9.15
H12800	12.2	0.42	15	0.04	1.02	> 10000	< 0.2	0.13	2.5	7.1	659	50	10	509	3.09	14.7	61	63.7	114	5.3	0.1	15	< 10	11.0
H14000	9.1	0.57	11	0.06	0.88	> 10000	< 0.2	0.14	3.0	6.7	604	50	< 10	1290	3.08	14.7	49	62.8	107	5.3	0.1	10	< 10	12.8
H14050	8.5	0.36	11	0.05	0.86	> 10000	< 0.2	0.19	1.8	5.0	632	50	< 10	428	2.76	15.0	39	26.0	147	4.9	0.1	7	< 10	26.1
H14050A	8.7	0.32	11	0.05	0.88	> 10000	< 0.2	0.20	1.8	5.0	663	50	< 10	449	2.89	15.4	40	26.9	159	5.1	< 0.1	6	< 10	24.8
H14100	10.7	0.44	9	0.05	0.98	> 10000	< 0.2	0.16	1.7	4.9	651	50	< 10	1210	3.00	16.7	40	26.9	119	5.6	0.1	5	< 10	17.4
H14150	12.1	0.49	7	0.05	0.92	> 10000	< 0.2	0.12	1.4	5.7	771	60	10	808	3.29	19.8	43	28.7	96	6.2	< 0.1	7	< 10	13.8
H14200	11.2	0.51	9	0.05	0.95	> 10000	< 0.2	0.15	2.3	5.8	771	50	10	1200	3.12	16.9	51	46.6	120	5.8	< 0.1	5	< 10	16.2
H14250	11.5	0.46	10	0.06	1.08	> 10000	< 0.2	0.17	2.6	6.2	787	60	20	1200	3.45	17.4	50	31.7	135	6.1	0.1	11	< 10	18.3
H14300	11.7	0.63	11	0.05	1.15	> 10000	< 0.2	0.16	2.1	6.8	710	60	30	459	3.29	16.1	58	36.3	86	5.9	< 0.1	11	< 10	10.4
H14350	12.0	0.43	20	0.05	1.06	> 10000	< 0.2	0.13	3.2	6.7	718	50	10	530	2.91	15.6	61	52.9	96	5.4	< 0.1	9	< 10	13.4
H14450	10.3	0.49	8	0.05	0.85	> 10000	< 0.2	0.14	1.1	5.5	724	40	10	208	2.39	7.47	34	27.3	59	6.2	< 0.1	< 3	< 10	9.61
H14550	7.7	0.43	10	0.05	0.76	> 10000	< 0.2	0.21	1.7	5.4	534	50	20	200	3.03	13.6	42	29.8	83	5.1	< 0.1	9	< 10	10.3
H14600	9.1	0.40	11	0.06	1.08	> 10000	< 0.2	0.19	2.4	6.1	641	50	20	541	2.99	15.5	46	33.6	141	5.3	< 0.1	6	< 10	15.5
H14650	11.5	0.49	16	0.05	1.08	> 10000	0.2	0.16	4.1	6.0	608	50	20	466	2.71	11.1	47	44.9	111	5.1	0.1	10	< 10	12.7
H14700	10.9	0.42	9	0.05	0.98	> 10000	< 0.2	0.16	1.2	5.9	684	50	20	459	3.07	16.2	41	24.3	70	5.9	0.1	8	< 10	16.7
H14700A	11.4	0.44	8	0.05	0.95	> 10000	< 0.2	0.15	1.0	5.4	725	50	20	364	2.92	16.9	38	20.3	68	5.7	0.1	6	< 10	14.2
H14800	9.9	0.32	23	0.05	0.96	> 10000	< 0.2	0.18	3.4	6.0	709	50	20	360	2.87	15.4	46	40.7	107	5.2	0.1	8	< 10	20.4
H16000	9.8	0.48	10	0.08	1.10	> 10000	< 0.2	0.21	2.1	7.4	782	60	30	519	2.95	17.1	43	33.4	96	6.6	0.1	7	< 10	18.0
H16050	9.5	0.47	11	0.06	0.86	> 10000	< 0.2	0.16	2.9	6.1	690	50	10	457	2.76	13.1	40	35.7	87	5.7	0.1	6	< 10	14.5
H16100	10.4	0.37	12	0.05	0.89	> 10000	< 0.2	0.18	2.6	5.2	706	50	< 10	481	2.55	13.8	40	30.0	117	4.9	< 0.1	5	< 10	17.5
H16150	9.8	0.40	8	0.05	0.85	> 10000	< 0.2	0.17	1.8	5.6	724	50	10	284	2.86	15.4	39	24.9	74	5.6	< 0.1	6	< 10	14.3
H16200	12.1	0.46	10	0.05	1.04	> 10000	< 0.2	0.16	2.3	5.9	732	50	10	576	3.08	14.4	49	49.2	111	5.4	0.1	10	< 10	15.6

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Analyte Symbol	Li	Be	B	Na	Mg	Al	Si	K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Rb
Unit Symbol	ppm	ppm	ppm	%	%	ppm	%	%	%	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Detection Limit	0.5	0.08	5	0.01	0.01	2	0.2	0.01	0.1	0.5	1	10	10	0.1	0.01	0.01	5	0.2	1	0.1	0.1	3	10	0.01
Analysis Method	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS
H16250	13.1	0.52	12	0.05	1.08	> 10000	< 0.2	0.15	2.2	6.5	669	50	30	651	2.78	14.4	54	59.7	127	5.5	0.1	3	< 10	14.3
H16300	12.9	0.61	13	0.05	1.10	> 10000	< 0.2	0.15	2.9	7.0	672	60	30	2210	3.63	22.7	61	54.4	128	5.7	0.1	14	< 10	11.9
H16350	10.7	0.46	10	0.05	0.98	> 10000	< 0.2	0.16	2.7	6.4	660	50	10	1390	3.30	18.4	45	31.9	156	5.7	0.1	9	< 10	14.0
H16400	10.4	0.50	9	0.05	0.89	> 10000	< 0.2	0.14	2.0	5.2	708	50	30	570	3.02	18.3	39	26.7	81	5.7	0.1	9	< 10	13.1
H16450	11.5	0.49	12	0.05	1.05	> 10000	< 0.2	0.17	3.1	6.1	700	50	20	843	3.08	15.9	52	36.1	107	5.7	0.1	11	< 10	18.0
H16500	10.6	0.50	12	0.06	1.01	> 10000	< 0.2	0.22	1.9	6.1	697	60	20	825	3.16	16.1	51	34.4	93	5.7	< 0.1	10	< 10	19.0
H16550	12.9	0.46	25	0.08	1.47	> 10000	< 0.2	0.29	2.5	9.8	697	80	40	872	3.71	21.7	81	53.4	141	6.6	0.1	13	< 10	20.2
H16600	8.8	0.40	17	0.06	1.47	> 10000	< 0.2	0.18	1.9	7.4	832	70	30	539	3.08	17.0	50	36.6	75	5.9	< 0.1	3	< 10	10.1
H16650	10.0	0.36	21	0.04	1.07	> 10000	< 0.2	0.14	2.3	6.1	749	50	20	493	3.00	16.0	48	34.9	109	5.3	0.1	10	< 10	11.8
H16700	10.0	0.40	17	0.05	1.11	> 10000	< 0.2	0.22	1.8	6.3	711	60	20	709	3.21	16.7	53	36.1	69	5.6	0.1	9	< 10	21.6
H16800	12.7	0.44	25	0.07	1.43	> 10000	< 0.2	0.24	3.2	9.7	698	70	50	763	3.82	24.6	92	57.0	93	6.2	0.1	21	< 10	18.9
HOE30S	14.1	0.40	27	0.05	1.28	> 10000	< 0.2	0.18	4.6	6.9	738	60	30	797	3.29	16.4	57	50.3	77	5.6	0.1	13	< 10	15.3
HOE15S	10.6	0.30	16	0.05	0.93	> 10000	< 0.2	0.22	3.2	4.6	637	40	< 10	383	2.61	11.7	43	37.0	118	4.7	< 0.1	6	< 10	16.9
HOE	10.8	0.52	14	0.04	0.85	> 10000	< 0.2	0.13	4.2	7.1	790	60	20	318	3.18	19.8	53	35.4	78	6.0	0.1	8	< 10	11.2
HOE15N	8.7	0.30	9	0.04	0.70	> 10000	< 0.2	0.13	1.9	5.1	657	50	< 10	169	2.57	10.2	36	22.5	56	4.8	< 0.1	7	< 10	10.5
HOE30N	11.8	0.47	9	0.05	1.15	> 10000	< 0.2	0.15	1.4	5.9	740	50	20	434	3.23	19.0	84	37.0	81	5.5	0.1	9	< 10	7.67
HOW30S	9.7	0.38	10	0.05	1.08	> 10000	< 0.2	0.15	1.7	7.1	875	60	30	516	3.04	16.4	49	41.3	79	5.4	0.1	5	< 10	9.14
HOW15S	13.5	0.57	22	0.06	1.29	> 10000	< 0.2	0.21	3.6	7.5	699	60	40	778	3.38	18.6	64	46.9	111	6.3	0.1	12	< 10	14.3
HOW	11.3	0.35	32	0.05	1.32	> 10000	< 0.2	0.25	4.5	6.5	724	60	20	531	3.11	16.8	58	47.5	144	5.3	< 0.1	10	< 10	16.9
HOW15N	11.2	0.45	20	0.07	1.64	> 10000	< 0.2	0.25	2.3	8.1	756	70	60	624	3.53	22.1	88	54.2	116	6.2	0.1	8	< 10	12.1
HOW30N	11.8	0.42	18	0.05	1.27	> 10000	< 0.2	0.21	2.1	6.0	684	50	20	543	3.18	15.7	55	43.9	117	5.5	0.1	8	< 10	11.5
H10300	9.9	0.37	7	0.05	1.00	> 10000	< 0.2	0.12	1.1	5.8	705	50	20	382	2.90	13.5	46	28.9	78	5.2	< 0.1	7	< 10	8.84
H12150S	10.3	0.33	34	0.04	1.01	> 10000	< 0.2	0.14	3.8	6.2	582	50	20	424	2.76	14.6	46	42.9	90	5.0	< 0.1	9	< 10	18.6
H14500S	9.1	0.42	12	0.04	0.91	> 10000	< 0.2	0.12	2.3	5.9	566	50	10	1050	3.07	16.7	58	39.2	120	4.9	0.1	11	< 10	9.26
H14400S	9.5	0.47	7	0.04	0.84	> 10000	< 0.2	0.11	1.2	5.9	649	50	20	820	3.01	16.4	42	25.5	83	5.7	< 0.1	8	< 10	6.02

Activation Laboratories Ltd.

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Analyte Symbol	Sr	Y	Zr	Nb	Mo	Ru	Pd	Ag	Cd	In	Sn	Sb	Te	Cs	Ba	La	Ce	Pr	Nd	Sm	Eu	Gd	Tb	Dy
Unit Symbol	ppm	ppm	ppm	ppm	ppm	ppb	ppb	ppm	ppm	ppb	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Detection Limit	0.1	0.001	0.5	0.005	0.1	10	3	0.2	0.01	1	1	0.02	0.01	0.001	3	0.002	0.01	0.002	0.002	0.001	0.001	0.01	0.001	0.001
Analysis Method	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS
H10000	71.8	10.9	7.3	0.316	3.3	< 10	6	0.4	0.52	25	1	1.52	0.21	0.845	193	14.1	27.0	3.56	13.5	3.19	0.685	2.70	0.408	2.13
H10050	38.0	6.78	5.4	0.296	3.8	< 10	< 3	0.3	1.12	22	< 1	1.39	0.06	0.686	93	10.4	20.5	2.41	9.05	2.11	0.445	1.79	0.268	1.42
H10100	46.7	6.40	6.6	0.296	4.4	< 10	< 3	0.3	1.05	21	< 1	1.32	0.15	0.979	97	10.1	19.5	2.40	8.87	2.08	0.448	1.74	0.264	1.40
H10150	50.3	8.39	7.4	0.249	2.6	10	< 3	0.3	1.00	24	< 1	1.02	0.13	0.924	73	11.0	21.6	2.70	10.5	2.42	0.542	2.18	0.333	1.78
H10200	57.6	7.00	6.3	0.250	3.5	< 10	< 3	0.3	1.36	18	< 1	1.15	0.10	1.06	189	9.75	19.2	2.34	8.94	2.05	0.446	1.79	0.271	1.41
H10250	44.5	10.1	8.7	0.303	2.7	< 10	< 3	0.3	0.49	27	< 1	1.27	0.13	0.958	162	14.0	26.6	3.43	13.1	3.05	0.664	2.58	0.395	2.07
H10350	37.7	7.47	7.1	0.242	3.6	< 10	< 3	0.2	0.56	24	< 1	1.27	< 0.01	0.729	63	10.4	20.6	2.55	9.35	2.24	0.491	1.96	0.297	1.56
H10400	75.3	9.06	7.6	0.274	3.8	20	< 3	0.5	1.74	24	< 1	1.52	0.10	2.60	179	12.4	24.5	3.12	11.7	2.67	0.587	2.31	0.358	1.84
H10450	34.9	9.20	7.9	0.218	2.6	< 10	< 3	0.3	1.38	26	< 1	1.16	0.09	1.07	150	11.9	23.8	2.97	11.3	2.77	0.591	2.37	0.351	1.85
H10500	41.7	6.26	5.8	0.165	2.8	< 10	< 3	0.3	0.53	20	< 1	1.10	0.08	0.857	53	8.64	17.0	2.11	7.91	1.85	0.395	1.55	0.243	1.29
H10550	37.4	7.56	6.6	0.298	2.4	< 10	< 3	0.2	0.35	20	< 1	1.17	0.08	0.791	57	11.2	22.0	2.71	10.1	2.35	0.500	1.99	0.304	1.57
H10600	73.4	10.8	8.0	0.295	2.6	20	< 3	0.5	0.82	27	< 1	1.27	0.05	1.23	230	14.9	27.5	3.54	13.3	3.13	0.684	2.69	0.414	2.14
H10650	100.0	5.81	7.3	0.352	2.3	< 10	< 3	0.3	0.85	22	< 1	1.22	0.14	0.817	195	8.69	17.5	2.11	7.69	1.79	0.397	1.57	0.241	1.25
H10700	87.0	8.85	8.5	0.238	2.7	< 10	< 3	0.3	0.76	26	< 1	1.16	< 0.01	1.43	153	10.9	22.4	2.74	10.5	2.56	0.582	2.20	0.343	1.81
H10800A	67.6	12.2	8.7	0.227	1.5	10	< 3	0.4	0.37	30	< 1	1.07	0.09	1.01	208	12.9	25.4	3.24	12.9	3.12	0.747	2.81	0.438	2.36
H10800	55.0	11.4	8.1	0.217	1.2	20	< 3	0.3	0.31	29	< 1	0.95	0.07	0.887	179	11.3	22.6	2.97	11.8	2.96	0.704	2.59	0.415	2.22
H12000	30.8	8.13	7.4	0.317	3.4	10	< 3	0.3	0.65	26	< 1	1.49	0.05	0.946	90	12.1	24.2	2.90	11.0	2.57	0.557	2.18	0.331	1.70
H12050	48.1	8.62	7.5	0.322	6.4	10	< 3	0.2	1.23	24	< 1	1.73	0.04	1.38	79	12.5	24.1	2.98	11.1	2.60	0.575	2.20	0.334	1.69
H12100	49.5	9.46	5.9	0.151	2.0	10	< 3	0.3	0.79	30	< 1	0.83	0.07	0.946	73	8.32	17.0	2.18	8.85	2.38	0.636	2.13	0.348	1.93
H12200	56.6	8.58	8.4	0.289	3.2	10	< 3	0.3	0.29	22	< 1	1.11	0.09	0.982	202	12.4	24.4	3.05	11.6	2.65	0.588	2.21	0.341	1.74
H12250	55.2	10.2	8.7	0.178	1.1	20	< 3	0.5	0.41	26	< 1	0.68	0.09	0.871	110	10.3	19.7	2.67	10.4	2.65	0.682	2.34	0.373	2.03
H12300	56.1	8.75	9.2	0.209	1.9	20	< 3	0.3	0.54	26	< 1	1.03	0.03	0.961	118	9.68	18.8	2.49	9.74	2.39	0.597	2.03	0.321	1.73
H12350	78.2	7.09	7.1	0.242	3.3	< 10	< 3	0.4	0.72	21	< 1	1.36	0.10	1.14	118	9.92	19.7	2.36	9.05	2.11	0.457	1.83	0.282	1.50
H12400	57.2	7.72	7.5	0.276	3.3	< 10	< 3	0.3	2.00	23	< 1	1.45	0.10	1.04	113	11.1	22.0	2.72	10.2	2.33	0.489	2.01	0.312	1.60
H12450	85.8	9.38	8.7	0.304	3.1	< 10	< 3	0.3	1.68	26	< 1	1.31	0.06	1.10	149	12.3	23.2	3.03	11.4	2.70	0.616	2.35	0.365	1.91
H12500	40.0	7.01	7.5	0.280	2.8	< 10	< 3	0.3	1.26	22	< 1	1.20	< 0.01	0.917	59	10.1	19.7	2.39	8.90	2.07	0.470	1.80	0.272	1.43
H12550	72.4	7.22	7.6	0.321	3.5	< 10	< 3	0.3	2.12	22	< 1	2.12	0.13	1.26	104	11.2	21.9	2.68	9.73	2.23	0.477	1.94	0.293	1.49
H12600	102	8.87	7.5	0.339	4.8	< 10	< 3	0.4	1.61	23	< 1	1.61	0.09	1.70	106	11.7	23.4	2.89	11.0	2.62	0.568	2.25	0.345	1.81
H12650	57.9	8.68	8.0	0.261	3.5	20	< 3	0.2	0.58	27	< 1	1.60	0.03	1.18	120	12.6	24.9	3.11	11.8	2.72	0.587	2.32	0.354	1.86
H12750	43.8	10.3	6.8	0.216	1.9	< 10	< 3	0.2	0.29	27	< 1	1.17	0.05	0.869	154	12.7	23.1	3.08	11.7	2.76	0.647	2.44	0.378	2.02
H12800	58.0	13.1	9.7	0.258	3.1	< 10	< 3	0.3	0.67	26	< 1	1.71	0.07	1.16	194	14.1	24.7	3.48	13.0	3.28	0.781	2.92	0.470	2.44
H14000	112	14.7	12.5	0.283	4.3	10	< 3	0.4	0.73	30	< 1	1.79	0.18	1.17	275	18.0	33.8	4.56	17.4	4.08	0.926	3.55	0.551	2.98
H14050	60.0	7.45	8.4	0.275	4.3	10	< 3	0.3	0.87	26	< 1	1.61	0.10	1.60	163	11.5	22.0	2.63	9.80	2.30	0.496	2.00	0.311	1.60
H14050A	62.8	7.46	7.9	0.303	4.4	10	< 3	0.3	0.86	26	< 1	1.64	0.05	1.50	171	11.8	22.7	2.77	10.3	2.40	0.503	2.03	0.307	1.58
H14100	56.7	9.45	8.3	0.269	4.6	< 10	< 3	0.3	1.17	28	< 1	1.35	< 0.01	1.26	144	13.7	29.2	3.42	12.9	3.04	0.614	2.51	0.390	1.98
H14150	56.0	9.06	9.7	0.329	4.3	10	< 3	0.3	0.39	32	< 1	1.38	0.07	1.21	179	13.7	27.4	3.47	13.2	3.02	0.633	2.44	0.382	1.95
H14200	80.1	11.3	9.5	0.333	3.8	10	< 3	0.3	0.92	29	< 1	1.59	0.11	1.30	240	15.7	30.6	3.82	14.5	3.43	0.737	2.91	0.435	2.22
H14250	88.0	9.89	9.6	0.317	3.8	20	< 3	0.3	0.56	31	< 1	1.66	0.09	1.37	275	14.5	27.9	3.45	12.8	2.97	0.643	2.58	0.396	2.00
H14300	48.8	9.48	7.7	0.251	3.7	20	< 3	0.3	0.90	26	< 1	1.59	< 0.01	1.15	127	12.3	23.5	3.00	11.5	2.75	0.590	2.28	0.365	1.95
H14350	81.0	9.26	8.4	0.298	3.8	< 10	< 3	0.3	0.71	28	< 1	1.72	0.02	1.44	181	12.0	22.6	2.93	10.8	2.63	0.601	2.26	0.357	1.91
H14450	44.5	8.63	10.0	0.301	2.5	< 10	< 3	0.3	0.19	26	< 1	1.08	0.02	1.20	161	13.2	24.7	3.13	11.9	2.72	0.595	2.33	0.334	1.74
H14550	55.0	8.17	6.4	0.246	4.4	< 10	< 3	< 0.2	1.53	28	< 1	1.78	< 0.01	0.799	140	12.1	22.9	2.84	10.7	2.48	0.545	2.08	0.316	1.64
H14600	74.4	7.47	8.6	0.204	3.0	< 10	< 3	0.3	1.87	23	< 1	1.05	0.05	1.24	118	9.27	19.0	2.40	9.24	2.23	0.494	1.88	0.292	1.55
H14650	118	12.5	10.2	0.261	2.4	< 10	< 3	0.3	1.18	27	< 1	1.32	0.06	1.26	186	15.6	28.1	3.89	15.2	3.59	0.777	3.06	0.470	2.47
H14700	43.4	8.69	9.0	0.288	2.9	10	< 3	0.2	0.26	26	< 1	1.20	0.09	1.16	109	12.3	23.7	2.97	10.9	2.52	0.579	2.24	0.338	1.75
H14700A	37.0	8.87	8.2	0.308	3.1	< 10	< 3	0.2	0.28	28	< 1	1.31	0.05	1.03	84	12.6	24.5	3.09	11.6	2.67	0.582	2.29	0.339	1.83
H14800	76.7	7.72	8.2	0.284	3.2	10	< 3	0.3	0.47	23	< 1	1.45	0.07	2.18	154	10.2	19.2	2.45	9.35	2.31	0.517	1.96	0.300	1.54
H16000	62.4	9.21	10.4	0.315	3.4	< 10	< 3	0.3	0.86	29	< 1	1.29	0.06	1.59	120	13.3	25.9	3.25	12.0	2.89	0.664	2.46	0.379	1.97
H16050	89.4	8.75	9.0	0.302	3.3	< 10	< 3	0.3	0.52	27	< 1	1.44	0.10	1.16	161	12.4	23.1	2.93	11.0	2.61	0.579	2.23	0.334	1.71
H16100	79.1	7.38	8.6	0.320	3.4	10	< 3	0.2	1.11	25	< 1	1.44	0.04	1.32	159	11.1	21.4	2.70	10.0	2.30	0.495	1.94	0.296	1.52
H16150	56.0	8.52	8.3	0.314	4.3	20	< 3	0.2	0.61	27	< 1	1.61	0.02	1.09	81	13.0	25.2	3.15	11.					

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Analyte Symbol	Sr	Y	Zr	Nb	Mo	Ru	Pd	Ag	Cd	In	Sn	Sb	Te	Cs	Ba	La	Ce	Pr	Nd	Sm	Eu	Gd	Tb	Dy
Unit Symbol	ppm	ppm	ppm	ppm	ppm	ppb	ppb	ppm	ppm	ppb	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Detection Limit	0.1	0.001	0.5	0.005	0.1	10	3	0.2	0.01	1	1	0.02	0.01	0.001	3	0.002	0.01	0.002	0.002	0.001	0.001	0.01	0.001	0.001
Analysis Method	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS
H16250	71.6	11.8	9.4	0.220	2.2	10	< 3	0.3	1.09	26	< 1	1.09	0.04	1.09	182	14.4	24.0	3.56	13.6	3.19	0.743	2.78	0.423	2.27
H16300	83.7	13.5	11.8	0.236	4.0	10	< 3	0.4	0.78	29	< 1	1.58	< 0.01	1.20	225	16.3	29.1	4.00	15.3	3.74	0.841	3.25	0.492	2.66
H16350	87.9	10.9	10.2	0.262	5.0	< 10	< 3	0.3	0.68	30	< 1	1.49	0.05	1.18	221	14.3	27.1	3.47	13.3	3.15	0.694	2.73	0.412	2.22
H16400	56.7	10.0	9.1	0.293	3.5	< 10	< 3	0.3	0.38	30	< 1	1.47	0.74	1.29	207	14.9	28.5	3.54	13.5	3.05	0.653	2.64	0.394	2.02
H16450	106	11.3	10.2	0.313	3.3	< 10	< 3	0.5	0.56	29	< 1	1.48	0.10	1.47	292	15.2	28.9	3.71	13.7	3.24	0.710	2.72	0.427	2.22
H16500	61.2	8.49	8.2	0.231	3.9	10	< 3	0.5	0.72	28	< 1	1.48	0.01	1.30	328	12.3	24.5	2.99	11.1	2.66	0.546	2.15	0.344	1.76
H16550	75.6	11.2	8.6	0.203	2.3	< 10	< 3	0.3	0.67	31	< 1	1.35	0.07	1.70	252	11.3	22.1	2.93	11.6	2.96	0.758	2.67	0.415	2.23
H16600	56.8	7.71	7.5	0.154	1.4	10	< 3	0.2	0.69	23	< 1	0.70	< 0.01	0.925	116	8.16	17.5	2.12	8.43	2.07	0.479	1.84	0.298	1.60
H16650	68.7	7.86	8.5	0.244	3.6	20	< 3	0.3	0.43	25	< 1	1.49	< 0.01	0.911	129	10.7	20.9	2.61	9.98	2.37	0.541	2.03	0.313	1.72
H16700	55.0	8.56	7.7	0.247	3.7	< 10	< 3	0.3	0.34	26	< 1	1.43	0.03	1.40	146	10.5	21.2	2.64	10.3	2.49	0.575	2.17	0.328	1.76
H16800	81.5	10.1	8.6	0.237	3.2	10	< 3	0.5	0.92	31	< 1	1.76	0.08	1.85	190	11.3	22.4	2.85	11.0	2.84	0.673	2.44	0.390	2.09
HOE30S	104	10.1	9.6	0.271	5.0	10	< 3	0.3	0.67	28	< 1	1.58	0.07	1.58	141	13.1	25.4	3.28	12.7	3.02	0.653	2.53	0.396	2.11
HOE15S	55.2	6.94	7.2	0.259	4.4	10	< 3	0.3	4.02	32	< 1	1.49	< 0.01	1.49	90	10.3	20.2	2.50	9.57	2.17	0.470	1.88	0.275	1.48
HOE	98.0	11.3	8.8	0.376	4.1	20	< 3	0.3	1.29	29	< 1	1.71	0.06	1.28	108	15.0	28.6	3.70	14.0	3.28	0.726	2.83	0.436	2.30
HOE15N	54.8	5.98	7.1	0.365	3.6	< 10	< 3	0.2	0.69	23	< 1	1.44	0.06	0.961	81	9.62	18.9	2.32	8.51	1.94	0.439	1.64	0.253	1.32
HOE30N	39.1	9.27	8.8	0.273	3.4	10	< 3	0.3	0.59	27	< 1	1.59	0.09	0.919	86	12.8	25.0	3.13	11.6	2.81	0.615	2.41	0.367	1.92
HOW30S	49.3	9.23	8.3	0.232	1.8	10	< 3	0.2	0.75	26	< 1	0.90	0.02	0.745	104	10.5	21.7	2.71	10.6	2.51	0.559	2.22	0.349	1.87
HOW15S	107	9.91	9.0	0.266	3.3	< 10	< 3	0.3	0.83	28	< 1	1.42	0.06	2.32	216	12.5	24.8	3.05	11.9	2.89	0.682	2.44	0.382	2.01
HOW	153	8.88	8.2	0.251	3.9	< 10	< 3	0.4	2.11	26	< 1	1.58	0.07	1.51	236	11.0	22.3	2.81	10.7	2.59	0.582	2.19	0.351	1.85
HOW15N	56.1	9.92	8.6	0.211	2.8	10	< 3	0.4	1.75	28	< 1	1.24	0.07	1.19	101	11.2	21.6	2.82	11.2	2.68	0.645	2.48	0.387	2.04
HOW30N	76.6	9.47	8.1	0.253	3.4	< 10	< 3	0.3	1.30	25	< 1	1.56	0.10	0.933	108	12.0	22.5	2.95	11.5	2.81	0.607	2.35	0.363	1.91
H10300	42.3	6.83	7.2	0.244	2.9	< 10	< 3	0.2	0.56	22	< 1	1.31	0.03	0.708	98	9.93	19.4	2.44	8.97	2.06	0.449	1.73	0.269	1.43
H12150S	90.8	6.94	7.3	0.254	3.4	10	< 3	0.3	0.42	24	< 1	1.34	0.09	0.971	127	9.19	18.4	2.34	8.61	2.12	0.494	1.78	0.283	1.49
H14500S	74.1	9.23	8.3	0.191	2.7	10	< 3	0.3	0.91	24	< 1	1.43	0.09	0.796	330	11.9	24.6	3.01	11.4	2.79	0.618	2.42	0.378	1.92
H14400S	45.4	10.7	8.0	0.262	3.9	< 10	< 3	0.2	0.91	29	< 1	1.30	0.95	0.753	216	14.3	27.9	3.58	13.6	3.20	0.708	2.72	0.414	2.22

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Report: A13-10754

Analyte Symbol	Ho	Er	Tm	Yb	Lu	Hf	Ta	W	Re	Pt	Au	Ti	Pb	Bi	Th	U	Ash Yield
Unit Symbol	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppb	ppb	ppb	ppm	ppm	ppm	ppm	ppm	%
Detection Limit	0.001	0.001	0.001	0.001	0.001	0.01	0.001	0.5	0.1	2	5	0.001	0.1	0.05	0.001	0.001	
Analysis Method	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS
H10000	0.397	1.15	0.147	0.965	0.147	0.16	0.005	0.7	1.4	< 2	< 5	0.143	8.8	0.20	3.57	1.34	59.4
H10050	0.263	0.733	0.093	0.611	0.091	0.13	0.003	< 0.5	0.4	< 2	< 5	0.153	7.8	0.16	3.07	1.07	56.8
H10100	0.260	0.718	0.090	0.585	0.087	0.15	0.006	< 0.5	0.4	< 2	< 5	0.169	7.3	0.14	2.89	1.05	58.1
H10150	0.331	0.897	0.115	0.723	0.109	0.17	0.005	< 0.5	0.8	< 2	< 5	0.168	9.7	0.13	3.26	1.07	63.4
H10200	0.260	0.727	0.093	0.586	0.091	0.14	0.003	< 0.5	0.8	< 2	< 5	0.180	8.9	0.14	2.45	0.949	48.9
H10250	0.380	1.07	0.138	0.879	0.141	0.19	0.005	< 0.5	0.4	< 2	< 5	0.151	8.4	0.17	3.81	1.27	67.9
H10350	0.286	0.796	0.104	0.639	0.099	0.16	0.003	< 0.5	0.6	< 2	< 5	0.148	7.8	0.17	3.14	0.900	65.9
H10400	0.345	0.979	0.123	0.776	0.121	0.15	0.003	< 0.5	0.8	< 2	< 5	0.187	8.7	0.14	3.29	1.08	51.3
H10450	0.353	0.969	0.125	0.822	0.120	0.17	0.004	< 0.5	0.4	< 2	< 5	0.191	12.7	0.15	3.29	0.810	83.1
H10500	0.235	0.661	0.085	0.529	0.079	0.12	0.002	< 0.5	1.0	< 2	< 5	0.171	6.0	0.15	2.57	0.849	41.5
H10550	0.289	0.823	0.100	0.650	0.096	0.15	0.006	< 0.5	0.3	< 2	< 5	0.102	8.0	0.15	3.00	1.12	61.8
H10600	0.407	1.13	0.141	0.915	0.142	0.16	0.006	< 0.5	0.9	< 2	< 5	0.194	8.5	0.14	3.56	1.28	50.6
H10650	0.233	0.639	0.086	0.560	0.085	0.16	0.011	< 0.5	1.5	< 2	< 5	0.179	7.3	0.14	3.31	1.41	53.0
H10700	0.338	0.948	0.124	0.799	0.120	0.18	0.005	< 0.5	1.4	< 2	< 5	0.202	8.0	0.12	3.07	1.05	60.8
H10800A	0.445	1.23	0.161	1.03	0.157	0.20	0.005	< 0.5	1.9	< 2	< 5	0.143	7.8	0.12	3.12	1.00	57.5
H10800	0.422	1.19	0.152	0.946	0.146	0.17	0.004	< 0.5	1.0	< 2	< 5	0.115	8.1	0.12	3.02	0.914	67.3
H12000	0.317	0.877	0.115	0.721	0.110	0.16	0.004	< 0.5	0.5	< 2	< 5	0.204	9.2	0.16	3.59	1.26	60.3
H12050	0.319	0.894	0.114	0.749	0.111	0.16	0.006	< 0.5	1.1	< 2	< 5	0.230	20.5	0.16	3.39	1.32	37.5
H12100	0.353	0.974	0.124	0.774	0.118	0.13	0.001	< 0.5	1.3	< 2	< 5	0.107	7.6	0.10	1.88	0.604	69.0
H12200	0.327	0.922	0.117	0.774	0.117	0.18	0.008	< 0.5	1.0	< 2	< 5	0.238	7.9	0.12	3.04	1.24	57.0
H12250	0.390	1.07	0.140	0.892	0.136	0.20	0.006	< 0.5	0.4	< 2	< 5	0.158	7.3	0.11	2.58	0.846	62.7
H12300	0.333	0.912	0.120	0.780	0.121	0.19	0.006	< 0.5	1.3	< 2	< 5	0.182	7.2	0.11	2.53	0.896	62.6
H12350	0.283	0.775	0.099	0.637	0.093	0.14	0.003	< 0.5	0.5	< 2	< 5	0.158	9.6	0.13	2.87	1.15	52.4
H12400	0.302	0.854	0.105	0.653	0.100	0.15	0.004	< 0.5	5.5	< 2	< 5	0.192	8.5	0.18	3.48	1.68	38.3
H12450	0.357	0.997	0.128	0.838	0.129	0.18	0.005	< 0.5	1.0	< 2	< 5	0.204	8.3	0.13	3.51	1.22	49.7
H12500	0.262	0.753	0.099	0.622	0.093	0.15	0.002	< 0.5	1.0	< 2	89	0.142	7.3	0.13	2.81	0.938	60.1
H12550	0.277	0.762	0.101	0.643	0.096	0.15	0.004	< 0.5	1.3	< 2	< 5	0.215	8.6	0.14	3.81	1.47	38.2
H12600	0.335	0.939	0.119	0.760	0.115	0.14	0.004	< 0.5	1.5	< 2	< 5	0.165	11.5	0.14	3.26	1.33	28.1
H12650	0.339	0.971	0.125	0.766	0.120	0.17	0.003	< 0.5	1.2	< 2	< 5	0.195	9.9	0.16	3.73	1.56	44.8
H12750	0.378	1.03	0.134	0.854	0.126	0.15	0.005	< 0.5	1.1	< 2	< 5	0.175	8.2	0.16	3.68	1.21	59.6
H12800	0.479	1.32	0.167	1.06	0.167	0.21	0.006	< 0.5	0.9	< 2	< 5	0.220	7.9	0.17	3.68	1.52	51.5
H14000	0.564	1.53	0.205	1.34	0.210	0.25	0.009	< 0.5	2.1	< 2	< 5	0.284	6.9	0.15	3.58	1.91	49.9
H14050	0.268	0.788	0.103	0.646	0.102	0.17	0.005	< 0.5	0.8	< 2	< 5	0.215	7.6	0.17	3.13	1.28	45.4
H14050A	0.291	0.802	0.104	0.666	0.105	0.17	0.006	< 0.5	1.6	< 2	< 5	0.236	58.0	0.17	3.27	1.28	42.5
H14100	0.374	1.06	0.131	0.814	0.122	0.16	0.004	< 0.5	0.5	< 2	< 5	0.272	8.9	0.16	3.33	1.46	50.4
H14150	0.367	1.01	0.131	0.840	0.125	0.21	0.005	< 0.5	0.7	< 2	< 5	0.210	9.9	0.17	3.88	1.51	64.4
H14200	0.421	1.19	0.150	0.953	0.146	0.19	0.006	< 0.5	0.7	< 2	< 5	0.265	8.2	0.17	3.75	1.52	54.9
H14250	0.374	1.06	0.138	0.916	0.141	0.19	0.006	< 0.5	1.2	< 2	< 5	0.249	8.1	0.18	4.15	1.48	51.5
H14300	0.366	1.00	0.124	0.804	0.122	0.16	0.003	< 0.5	1.0	< 2	< 5	0.191	8.8	0.14	3.54	1.13	58.2
H14350	0.341	0.966	0.127	0.797	0.129	0.17	0.004	< 0.5	0.7	< 2	< 5	0.215	7.9	0.13	3.35	1.19	38.0
H14450	0.332	0.894	0.117	0.781	0.115	0.22	0.007	< 0.5	0.4	< 2	< 5	0.235	7.0	0.15	3.35	1.42	65.5
H14550	0.304	0.846	0.112	0.759	0.114	0.09	0.006	< 0.5	0.8	< 2	< 5	0.197	8.4	0.18	3.48	1.50	32.8
H14600	0.287	0.785	0.109	0.687	0.105	0.19	0.006	< 0.5	1.1	< 2	< 5	0.196	7.1	0.13	2.69	0.940	48.4
H14650	0.463	1.31	0.163	1.06	0.167	0.19	0.006	< 0.5	0.7	< 2	< 5	0.213	7.2	0.15	3.63	1.34	40.1
H14700	0.330	0.929	0.118	0.726	0.115	0.19	0.006	< 0.5	0.7	14	< 5	0.198	7.6	0.15	3.22	1.13	68.8
H14700A	0.340	0.961	0.124	0.789	0.115	0.18	0.006	< 0.5	0.6	37	< 5	0.198	8.6	0.16	3.40	1.26	65.3
H14800	0.294	0.815	0.110	0.709	0.111	0.17	0.007	< 0.5	1.1	4	< 5	0.216	9.6	0.14	3.36	1.28	42.9
H16000	0.361	0.997	0.125	0.821	0.124	0.22	0.010	< 0.5	0.7	< 2	< 5	0.254	8.1	0.18	3.36	1.39	46.5
H16050	0.325	0.911	0.118	0.755	0.113	0.18	0.010	< 0.5	1.6	< 2	< 5	0.226	7.8	0.16	3.20	1.25	48.0
H16100	0.290	0.808	0.102	0.668	0.103	0.18	0.005	< 0.5	0.7	< 2	< 5	0.216	7.9	0.14	3.06	1.23	41.5
H16150	0.341	0.920	0.122	0.775	0.117	0.18	0.006	< 0.5	1.6	< 2	236	0.201	8.6	0.18	3.66	1.31	44.4
H16200	0.351	0.992	0.127	0.820	0.123	0.20	0.004	< 0.5	1.8	< 2	< 5	0.199	8.1	0.16	3.49	1.21	50.0

Activation Laboratories Ltd.

Report: A13-10754

Analyte Symbol	Ho	Er	Tm	Yb	Lu	Hf	Ta	W	Re	Pt	Au	Ti	Pb	Bi	Th	U	Ash Yield
Unit Symbol	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppb	ppb	ppb	ppm	ppm	ppm	ppm	ppm	%
Detection Limit	0.001	0.001	0.001	0.001	0.001	0.01	0.001	0.5	0.1	2	5	0.001	0.1	0.05	0.001	0.001	
Analysis Method	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS
H16250	0.428	1.18	0.157	0.993	0.158	0.19	0.004	< 0.5	2.0	< 2	< 5	0.237	228	0.13	3.02	1.02	50.7
H16300	0.497	1.43	0.179	1.14	0.182	0.23	0.005	< 0.5	7.2	< 2	< 5	0.257	7.8	0.17	3.61	1.46	57.2
H16350	0.392	1.12	0.150	0.944	0.150	0.20	0.006	< 0.5	1.7	< 2	< 5	0.221	11.6	0.18	3.64	1.53	54.2
H16400	0.373	1.02	0.132	0.860	0.128	0.20	0.007	< 0.5	0.6	< 2	< 5	0.237	8.1	0.17	3.76	1.39	43.7
H16450	0.398	1.16	0.150	0.991	0.153	0.20	0.008	< 0.5	0.9	< 2	< 5	0.283	7.7	0.16	4.04	1.45	43.5
H16500	0.330	0.924	0.112	0.738	0.113	0.16	0.002	< 0.5	1.4	< 2	< 5	0.209	8.1	0.16	3.34	1.08	56.4
H16550	0.411	1.13	0.146	0.948	0.146	0.18	0.003	< 0.5	0.4	< 2	< 5	0.193	8.1	0.13	2.59	0.817	52.0
H16600	0.291	0.795	0.107	0.673	0.102	0.17	0.002	< 0.5	2.0	< 2	< 5	0.139	5.7	0.09	2.16	0.996	58.8
H16650	0.310	0.839	0.111	0.728	0.109	0.18	0.004	< 0.5	0.5	< 2	< 5	0.164	9.2	0.14	3.28	1.32	43.0
H16700	0.333	0.914	0.120	0.745	0.114	0.16	0.005	< 0.5	0.3	< 2	< 5	0.184	7.6	0.14	2.84	1.08	61.1
H16800	0.378	1.04	0.132	0.866	0.135	0.18	0.005	< 0.5	1.7	< 2	< 5	0.179	8.2	0.13	2.90	1.17	50.2
HOE30S	0.389	1.08	0.138	0.889	0.135	0.18	0.003	< 0.5	1.8	< 2	< 5	0.195	7.8	0.14	3.55	1.88	38.5
HOE15S	0.266	0.751	0.097	0.621	0.091	0.15	0.003	< 0.5	0.7	< 2	< 5	0.276	8.3	0.18	3.18	0.970	34.9
HOE	0.434	1.18	0.153	0.971	0.148	0.19	0.011	< 0.5	0.8	< 2	< 5	0.179	8.6	0.23	3.89	1.52	47.1
HOE15N	0.240	0.672	0.087	0.556	0.086	0.16	0.008	< 0.5	0.5	< 2	< 5	0.183	6.5	0.14	3.48	1.27	46.5
HOE30N	0.362	0.999	0.124	0.782	0.123	0.18	0.004	< 0.5	0.9	< 2	25	0.151	8.5	0.16	3.73	1.31	69.6
HOW30S	0.352	0.968	0.131	0.766	0.120	0.18	0.002	< 0.5	0.9	< 2	< 5	0.147	7.0	0.11	2.78	0.814	84.8
HOW15S	0.375	1.03	0.135	0.857	0.135	0.20	0.003	< 0.5	1.0	< 2	< 5	0.165	9.5	0.16	3.61	0.973	51.8
HOW	0.350	0.959	0.126	0.809	0.124	0.17	0.003	< 0.5	1.3	< 2	< 5	0.155	8.1	0.12	2.85	1.09	44.5
HOW15N	0.387	1.06	0.138	0.876	0.130	0.19	0.003	< 0.5	1.4	< 2	< 5	0.155	8.3	0.11	2.45	0.879	71.1
HOW30N	0.364	1.00	0.125	0.806	0.122	0.17	0.003	< 0.5	1.2	< 2	< 5	0.186	8.5	0.14	3.48	1.17	46.7
H10300	0.261	0.730	0.095	0.594	0.092	0.15	0.001	< 0.5	0.5	< 2	< 5	0.171	7.8	0.13	3.31	0.873	63.3
H12150S	0.281	0.779	0.098	0.655	0.098	0.16	0.006	< 0.5	0.5	< 2	< 5	0.190	7.1	0.16	2.80	1.05	41.2
H14500S	0.361	1.01	0.131	0.832	0.130	0.18	0.002	0.7	0.2	< 2	< 5	0.141	7.6	0.14	3.45	1.12	64.9
H14400S	0.408	1.14	0.149	0.920	0.142	0.17	0.005	< 0.5	0.6	6	< 5	0.161	8.1	0.16	3.65	1.35	64.3

Quality Control																								
Analyte Symbol	Li	Be	B	Na	Mg	Al	Si	K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Rb
Unit Symbol	ppm	ppm	ppm	%	%	ppm	%	%	%	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Detection Limit	0.5	0.08	5	0.01	0.01	2	0.2	0.01	0.1	0.5	1	10	10	0.1	0.01	0.01	5	0.2	1	0.1	0.1	3	10	0.01
Analysis Method	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS
New Ash Meas	8.7	0.15	294	0.12	2.35	3910	0.5	> 10.0	24.6	1.7	113			257	0.19	1.29	7	124	200	1.4	0.2	33		95.8
New Ash Cert	9.3	0.11	411.00	0.12	2.57	4161.00	0.40	13.08	20.2	2.30	126.00			235.70	0.20	1.33	7.00	155.20	250.00	1.30	0.40	19		98.16
H10700 Orig	11.7	0.39	20	0.06	1.24	> 10000	< 0.2	0.16	3.3	7.5	723	60	30	630	3.27	18.5	62	45.1	104	6.0	0.1	12	< 10	12.9
H10700 Dup	12.2	0.42	19	0.06	1.24	> 10000	< 0.2	0.16	3.4	7.3	797	60	30	639	3.14	19.1	64	45.5	106	6.1	0.1	10	< 10	12.7
H12600 Orig	13.1	0.36	32	0.07	1.34	> 10000	< 0.2	0.49	4.2	6.1	779	50	40	854	3.10	16.8	55	54.0	96	5.4	0.1	13	< 10	18.4
H12600 Dup	12.5	0.35	36	0.07	1.35	> 10000	< 0.2	0.49	4.5	6.1	740	60	30	873	3.26	16.7	55	54.8	97	5.4	0.1	12	< 10	18.2
H14550 Orig	8.1	0.44	11	0.05	0.81	> 10000	< 0.2	0.22	2.0	5.8	572	50	20	213	3.21	14.3	45	31.6	87	5.4	< 0.1	10	< 10	10.8
H14550 Dup	7.4	0.42	9	0.05	0.70	> 10000	< 0.2	0.20	1.4	4.9	496	50	20	186	2.85	12.8	40	28.0	79	4.7	< 0.1	9	< 10	9.78
H16400 Orig	10.8	0.52	8	0.05	0.93	> 10000	< 0.2	0.15	2.1	5.3	715	50	30	585	3.13	19.1	41	27.0	83	5.9	0.1	9	< 10	13.6
H16400 Dup	10.0	0.48	10	0.05	0.84	> 10000	< 0.2	0.14	1.9	5.2	701	50	20	556	2.92	17.4	37	26.4	79	5.5	0.1	9	< 10	12.7
H14400S Orig	10.0	0.47	8	0.04	0.83	> 10000	< 0.2	0.11	1.2	5.9	641	50	20	800	2.91	16.3	41	25.3	82	5.6	< 0.1	8	< 10	5.90
H14400S Dup	9.1	0.47	7	0.04	0.85	> 10000	< 0.2	0.11	1.2	6.0	657	60	20	841	3.11	16.4	43	25.8	84	5.8	0.1	8	< 10	6.14
Method Blank	< 0.5	< 0.08	< 5	< 0.01	< 0.01	< 2	< 0.2	< 0.01	< 0.1	< 0.5	< 1	< 10	< 10	< 0.1	< 0.01	< 0.01	< 5	< 0.2	< 1	< 0.1	< 0.1	< 3	< 10	< 0.01

Quality Control																								
Analyte Symbol	Sr	Y	Zr	Nb	Mo	Ru	Pd	Ag	Cd	In	Sn	Sb	Te	Cs	Ba	La	Ce	Pr	Nd	Sm	Eu	Gd	Tb	Dy
Unit Symbol	ppm	ppm	ppm	ppm	ppm	ppb	ppb	ppm	ppm	ppb	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Detection Limit	0.1	0.001	0.5	0.005	0.1	10	3	0.2	0.01	1	1	0.02	0.01	0.001	3	0.002	0.01	0.002	0.002	0.001	0.001	0.01	0.001	0.001
Analysis Method	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS
New Ash Meas	2610	1.15	4.8	0.374	2.1				0.61	6		0.30	2.42	0.261	238	2.19	3.93	0.468	1.64	0.381	0.079	0.31	0.044	0.215
New Ash Cert	2176.80	1.09	2.20	0.35	1.70				0.53	6		0.29	1.42	0.27	215.00	2.20	4.15	0.47	1.71	0.34	0.08	0.30	0.04	0.19
H10700 Orig	85.7	8.71	8.7	0.231	2.7	< 10	< 3	0.3	0.74	26	< 1	1.16	< 0.01	1.42	153	10.6	21.9	2.69	10.1	2.50	0.572	2.17	0.342	1.80
H10700 Dup	88.3	8.98	8.4	0.244	2.7	< 10	< 3	0.3	0.78	26	< 1	1.17	< 0.01	1.45	154	11.2	22.8	2.78	10.8	2.63	0.592	2.23	0.344	1.83
H12600 Orig	101	8.97	7.6	0.355	4.6	< 10	< 3	0.4	1.61	24	< 1	1.50	0.09	1.72	101	11.8	23.5	2.87	11.0	2.58	0.556	2.24	0.339	1.79
H12600 Dup	103	8.78	7.3	0.322	4.9	< 10	< 3	0.4	1.61	23	< 1	1.72	0.10	1.67	110	11.6	23.2	2.91	10.9	2.66	0.580	2.26	0.351	1.82
H14550 Orig	60.7	9.04	6.7	0.256	4.6	< 10	< 3	< 0.2	1.58	29	< 1	1.82	< 0.01	0.847	152	13.1	24.3	3.03	11.4	2.66	0.583	2.24	0.341	1.77
H14550 Dup	49.4	7.29	6.2	0.236	4.1	< 10	< 3	< 0.2	1.48	27	< 1	1.74	< 0.01	0.751	128	11.1	21.5	2.64	9.99	2.31	0.507	1.93	0.291	1.51
H16400 Orig	57.8	10.4	9.3	0.274	3.7	20	< 3	0.3	0.40	30	< 1	1.48	0.79	1.30	215	15.2	29.1	3.54	13.6	3.10	0.660	2.75	0.405	2.05
H16400 Dup	55.6	9.68	8.9	0.313	3.4	< 10	< 3	0.3	0.36	30	< 1	1.45	0.70	1.28	200	14.7	28.0	3.53	13.4	3.00	0.647	2.53	0.382	1.99
H14400S Orig	44.9	10.5	8.0	0.272	3.9	20	< 3	0.2	0.91	28	< 1	1.29	0.89	0.751	215	14.3	27.4	3.53	13.5	3.14	0.695	2.72	0.408	2.21
H14400S Dup	45.8	10.9	8.1	0.251	3.9	< 10	< 3	0.3	0.91	30	< 1	1.31	1.02	0.755	217	14.4	28.4	3.63	13.7	3.27	0.720	2.72	0.421	2.23
Method Blank	< 0.1	< 0.001	< 0.5	< 0.005	< 0.1	< 10	< 3	< 0.2	< 0.01	< 1	< 1	< 0.02	< 0.01	< 0.001	< 3	< 0.002	< 0.01	< 0.002	< 0.002	< 0.001	< 0.001	< 0.01	< 0.001	< 0.001

Quality Control																	
Analyte Symbol	Ho	Er	Tm	Yb	Lu	Hf	Ta	W	Re	Pt	Au	Ti	Pb	Bi	Th	U	Ash Yield
Unit Symbol	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppb	ppb	ppb	ppm	ppm	ppm	ppm	ppm	%
Detection Limit	0.001	0.001	0.001	0.001	0.001	0.01	0.001	0.5	0.1	2	5	0.001	0.1	0.05	0.001	0.001	
Analysis Method	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS	AR-MS
New Ash Meas	0.040	0.108	0.016	0.109	0.019	0.08			9.6			0.042	10.7	0.14	0.456	0.187	
New Ash Cert	0.03	0.09	0.01	0.08	0.01	0.04			1.10			0.04	12.40	0.07	0.41	0.18	
H10700 Orig	0.335	0.947	0.123	0.776	0.119	0.18	0.004	< 0.5	1.4	< 2	< 5	0.204	8.0	0.12	3.03	1.05	60.8
H10700 Dup	0.340	0.948	0.125	0.821	0.122	0.17	0.005	< 0.5	1.4	< 2	< 5	0.201	8.0	0.12	3.10	1.05	60.8
H12600 Orig	0.328	0.917	0.119	0.748	0.111	0.14	0.004	< 0.5	1.8	< 2	< 5	0.159	11.3	0.13	3.34	1.45	28.1
H12600 Dup	0.341	0.960	0.119	0.771	0.118	0.14	0.004	< 0.5	1.2	< 2	< 5	0.171	11.6	0.14	3.18	1.21	28.1
H14550 Orig	0.329	0.908	0.120	0.838	0.125	0.10	0.006	< 0.5	0.9	< 2	< 5	0.201	9.0	0.18	3.64	1.46	32.8
H14550 Dup	0.279	0.784	0.104	0.680	0.104	0.09	0.005	< 0.5	0.6	< 2	< 5	0.194	7.8	0.18	3.32	1.54	32.8
H16400 Orig	0.386	1.02	0.131	0.872	0.129	0.20	0.007	< 0.5	0.4	< 2	< 5	0.247	8.2	0.17	3.99	1.41	43.7
H16400 Dup	0.359	1.02	0.133	0.849	0.126	0.19	0.007	< 0.5	0.8	< 2	< 5	0.227	8.0	0.16	3.54	1.36	43.7
H14400S Orig	0.401	1.11	0.148	0.900	0.140	0.17	0.005	< 0.5	0.3	9	< 5	0.160	8.0	0.16	3.43	1.33	64.3
H14400S Dup	0.415	1.17	0.151	0.941	0.144	0.17	0.004	< 0.5	1.0	3	< 5	0.163	8.2	0.16	3.87	1.37	64.3
Method Blank	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.01	< 0.001	< 0.5	< 0.1	< 2	< 5	< 0.001	< 0.1	< 0.05	< 0.001	< 0.001	