



Date Submitted: 07-Dec-15
Invoice No.: A15-10700
Invoice Date: 30-Dec-15
Your Reference: 3000589277

Geological Survey of Canada
475-601 BOOTH ST
OTTAWA ON K1A0E8
Canada

ATTN: Alex Zagorevski

CERTIFICATE OF ANALYSIS

37 Rock samples were submitted for analysis.

The following analytical package was requested:

Code 4LITHORES (11+) Major Elements Fusion ICP(WRA)/Trace Elements Fusion ICP/MS(WRA4B2)

REPORT **A15-10700**

This report may be reproduced without our consent. If only selected portions of the report are reproduced, permission must be obtained. If no instructions were given at time of sample submittal regarding excess material, it will be discarded within 90 days of this report. Our liability is limited solely to the analytical cost of these analyses. Test results are representative only of material submitted for analysis.

Notes:

We recommend using option 4B1 for accurate levels of the base metals Cu, Pb, Zn, Ni and Ag. Option 4B-INAA for As, Sb, high W >100ppm, Cr >1000ppm and Sn >50ppm by Code 5D. Values for these elements provided by Fusion ICP/MS, are order of magnitude only and are provided for general information. Mineralized samples should have the Quant option selected or request assays for values which exceed the range of option 4B1. Total includes all elements in % oxide to the left of total. Zr is now being reported from FUS-ICP instead of FUS-MS.

CERTIFIED BY:

A handwritten signature in black ink, appearing to read "Elitsa Hrischeva".

Elitsa Hrischeva, Ph.D.
Quality Control

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Results

Analyte Symbol	SiO2	Al2O3	Fe2O3(T)	MnO	MgO	CaO	Na2O	K2O	TiO2	P2O5	LOI	Total	Sc	Be	V	Cr	Co	Ni	Cu	Zn	Ga	Ge	As
Unit Symbol	%	%	%	%	%	%	%	%	%	%	%	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Lower Limit	0.01	0.01	0.01	0.001	0.01	0.01	0.01	0.01	0.001	0.01		0.01	1	1	5	20	1	20	10	30	1	0.5	5
Method Code	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS
15ZE933	40.54	0.99	8.11	0.116	39.93	0.82	0.14	0.02	0.011	0.01	8.73	99.43	9	< 1	38	2410	103	2140	10	40	1	0.7	< 5
15ZE953	49.26	14.55	12.23	0.090	7.83	3.86	2.33	1.65	1.394	0.09	5.61	98.89	35	< 1	366	190	40	130	50	90	18	1.1	< 5
15ZE955	57.30	15.23	9.93	0.132	4.59	2.43	5.76	0.07	0.600	0.06	3.80	99.91	32	< 1	184	70	23	40	< 10	70	15	0.8	< 5
15ZE959A	48.28	13.86	5.75	0.111	12.88	15.08	1.25	0.06	0.177	0.01	2.86	100.3	41	< 1	150	770	35	320	80	< 30	9	1.1	< 5
15ZE959B-	37.92	0.86	8.22	0.118	42.42	1.06	0.06	< 0.01	0.011	0.02	9.14	99.84	10	< 1	36	2400	106	2180	< 10	40	< 1	0.7	< 5
15ZE961A	38.62	0.62	8.17	0.114	40.46	0.51	0.03	< 0.01	0.006	< 0.01	10.05	98.59	8	< 1	33	2460	110	2280	< 10	40	< 1	0.5	< 5
15ZE965	39.26	9.69	3.28	0.030	33.02	4.73	0.16	0.01	0.138	< 0.01	9.61	99.92	11	< 1	74	3810	43	1110	10	< 30	5	0.8	< 5
15ZE967A	38.66	0.88	7.95	0.119	43.04	0.98	0.02	< 0.01	0.007	< 0.01	7.34	98.99	11	< 1	39	2770	106	2210	10	40	< 1	0.9	< 5
15ZE967E	52.46	2.65	6.59	0.125	35.27	1.62	0.03	< 0.01	0.024	< 0.01	1.06	99.83	24	< 1	121	4010	67	1090	10	40	3	1.2	< 5
ZE15AC009A	39.20	0.61	8.46	0.117	44.07	0.56	0.01	< 0.01	0.005	0.02	7.25	100.3	8	< 1	32	2030	111	2320	< 10	40	< 1	0.5	< 5
ZE15AC011A	41.32	0.87	7.62	0.111	41.46	0.71	0.02	< 0.01	0.004	0.01	7.48	99.62	8	< 1	32	2450	105	2220	< 10	40	< 1	0.6	< 5
ZE15AC013A	39.45	0.62	7.99	0.115	41.25	0.69	0.01	< 0.01	0.003	0.01	10.09	100.2	10	< 1	34	2710	102	2080	10	40	< 1	0.5	< 5
ZE15AC020A	40.92	0.79	8.16	0.116	40.86	0.70	0.02	< 0.01	0.008	< 0.01	7.99	99.57	8	< 1	36	3120	106	2150	30	40	1	0.6	< 5
ZE15AC022A	39.23	0.59	8.12	0.110	40.62	0.63	0.02	< 0.01	0.005	0.01	10.21	99.55	9	< 1	31	2360	106	2210	< 10	40	< 1	0.6	< 5
ZE15AC062	53.26	13.96	12.39	0.200	5.16	6.22	5.48	0.21	1.637	0.15	1.58	100.3	33	< 1	297	160	32	100	40	100	18	0.9	< 5
ZE15SM014A	49.79	14.12	11.74	0.197	7.02	10.74	2.85	0.14	1.517	0.14	1.87	100.1	39	< 1	346	150	41	60	60	70	17	1.1	< 5
ZE15SM014B	42.12	0.95	9.02	0.126	42.51	0.93	0.07	< 0.01	0.026	0.02	4.43	100.2	10	< 1	42	2710	111	2240	< 10	40	1	0.6	< 5
ZE15SM023-1	43.62	1.01	8.73	0.128	41.35	1.37	0.03	< 0.01	0.015	< 0.01	3.26	99.52	12	< 1	52	3230	108	2230	< 10	40	1	0.7	< 5
ZE15SM030	49.47	14.24	10.34	0.158	8.43	8.80	3.67	0.26	1.321	0.14	3.65	100.5	37	< 1	288	360	42	180	80	90	14	1.1	< 5
ZE15SM031A	48.28	15.35	8.49	0.145	6.77	13.61	1.77	0.19	0.933	0.06	4.31	99.92	36	< 1	261	300	35	110	70	60	16	1.4	< 5
ZE15SM033	53.33	14.62	11.28	0.154	4.41	7.84	4.67	0.15	1.077	0.10	1.77	99.40	34	< 1	359	70	32	40	60	90	16	0.9	< 5
ZE15SM034-1	40.80	1.12	7.57	0.108	42.65	0.76	0.09	< 0.01	0.030	< 0.01	6.68	99.82	8	< 1	41	2440	100	2110	< 10	40	1	0.6	< 5
ZE15SM034-2	40.04	0.68	8.76	0.112	41.92	0.65	0.07	< 0.01	0.016	0.01	7.85	100.1	8	< 1	32	1900	110	2230	< 10	40	< 1	0.5	< 5
ZE15SM038	41.19	0.86	8.80	0.126	42.42	1.03	0.03	< 0.01	0.008	0.01	4.60	99.08	11	< 1	46	2680	108	2160	10	40	1	0.7	< 5
ZE15SM039B	49.17	13.95	10.31	0.179	7.98	11.58	1.98	0.20	1.515	0.16	2.14	99.17	35	< 1	303	340	40	170	50	60	17	1.2	< 5
ZE15SM040	49.75	14.59	10.56	0.178	6.53	10.50	3.29	0.32	1.371	0.10	2.72	99.90	37	< 1	317	150	39	70	60	80	17	1.3	< 5
ZE15SM045	42.23	0.95	7.99	0.118	39.73	1.02	0.08	< 0.01	0.032	< 0.01	6.55	98.71	10	< 1	43	2530	105	2160	10	40	1	0.6	< 5
ZE15SM050	42.13	8.87	10.18	0.177	7.49	20.32	4.51	0.12	1.322	0.12	5.59	100.8	38	< 1	306	250	40	120	50	70	7	0.8	< 5
ZE15SM054A	54.17	14.99	11.65	0.165	4.28	8.81	2.82	0.14	0.993	0.10	2.48	100.6	35	< 1	357	40	32	30	40	80	17	1.1	< 5
ZE15SM055A	41.97	0.80	8.01	0.117	42.30	0.91	0.05	< 0.01	0.018	< 0.01	5.65	99.84	10	< 1	43	2650	107	2190	< 10	30	< 1	0.8	< 5
ZE15SM055B	40.95	0.67	8.40	0.117	41.46	0.91	0.03	< 0.01	0.007	< 0.01	7.06	99.59	10	< 1	41	2540	103	2140	10	30	< 1	0.7	< 5
ZE15SM056	41.50	0.73	7.78	0.117	41.72	1.37	0.02	< 0.01	0.007	< 0.01	5.95	99.21	11	< 1	44	2660	110	2340	40	40	< 1	0.6	< 5
ZE15SM057	42.08	0.92	8.13	0.117	39.90	1.06	0.02	< 0.01	0.008	< 0.01	7.13	99.37	11	< 1	50	2510	104	2160	10	40	< 1	0.6	< 5
ZE15SM090	50.83	13.11	12.93	0.192	5.62	8.18	4.36	0.44	1.768	0.09	1.85	99.38	37	< 1	474	120	38	90	40	90	18	1.0	< 5
ZE15SM094	59.89	16.69	5.27	0.132	2.74	5.65	4.23	1.77	0.518	0.23	1.40	98.52	11	1	147	60	13	40	20	60	20	1.2	< 5
ZE15SM105	46.93	13.62	13.30	0.214	5.53	13.00	3.82	0.25	1.821	0.19	1.45	100.1	37	< 1	379	120	39	60	60	100	16	1.1	< 5
ZE15SM112A	33.28	11.61	4.86	0.058	3.02	22.58	2.95	1.75	1.516	0.78	18.18	100.6	20	1	160	240	23	80	40	40	10	0.6	< 5

Results

Analyte Symbol	Rb	Sr	Y	Zr	Nb	Mo	Ag	In	Sn	Sb	Cs	Ba	La	Ce	Pr	Nd	Sm	Eu	Gd	Tb	Dy	Ho	Er
Unit Symbol	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Lower Limit	1	2	0.5	1	0.2	2	0.5	0.1	1	0.2	0.1	3	0.05	0.05	0.01	0.05	0.01	0.005	0.01	0.01	0.01	0.01	0.01
Method Code	FUS-MS	FUS-ICP	FUS-MS	FUS-ICP	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-ICP	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS
15ZE933	< 1	4	1.7	35	0.9	< 2	< 0.5	< 0.1	< 1	< 0.2	< 0.1	< 3	0.76	1.62	0.17	0.69	0.17	0.034	0.14	0.03	0.24	0.05	0.17
15ZE953	22	194	22.5	92	1.2	< 2	< 0.5	< 0.1	< 1	< 0.2	1.1	301	2.49	8.17	1.40	7.50	2.72	1.05	3.49	0.62	4.13	0.83	2.50
15ZE955	< 1	25	11.5	43	1.0	< 2	< 0.5	< 0.1	< 1	0.5	0.2	17	1.78	4.53	0.69	3.40	1.14	0.433	1.68	0.31	2.18	0.46	1.38
15ZE959A	< 1	323	4.3	9	0.4	< 2	< 0.5	< 0.1	< 1	< 0.2	< 0.1	13	0.40	1.04	0.15	0.85	0.38	0.201	0.60	0.11	0.80	0.18	0.55
15ZE959B-	< 1	9	< 0.5	4	0.3	< 2	< 0.5	< 0.1	< 1	< 0.2	< 0.1	< 3	0.05	0.22	0.03	0.11	0.04	< 0.005	0.04	< 0.01	0.05	< 0.01	0.03
15ZE961A	< 1	< 2	< 0.5	3	0.3	< 2	< 0.5	< 0.1	< 1	< 0.2	< 0.1	< 3	0.09	0.17	0.02	0.11	0.03	< 0.005	0.02	< 0.01	0.02	< 0.01	0.01
15ZE965	< 1	4	2.1	7	4.2	< 2	< 0.5	< 0.1	< 1	< 0.2	< 0.1	4	0.22	0.62	0.11	0.46	0.22	0.013	0.22	0.04	0.32	0.07	0.21
15ZE967A	< 1	< 2	< 0.5	2	0.5	< 2	< 0.5	< 0.1	< 1	< 0.2	< 0.1	< 3	< 0.05	0.09	0.01	0.07	0.02	< 0.005	0.03	< 0.01	0.01	< 0.01	0.01
15ZE967E	< 1	< 2	< 0.5	3	0.4	< 2	< 0.5	< 0.1	< 1	< 0.2	< 0.1	< 3	0.07	0.19	0.02	0.13	0.04	< 0.005	0.02	< 0.01	0.03	< 0.01	0.04
ZE15AC009A	< 1	< 2	< 0.5	2	0.3	< 2	< 0.5	< 0.1	< 1	< 0.2	< 0.1	< 3	0.14	0.19	< 0.01	< 0.05	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
ZE15AC011A	< 1	< 2	< 0.5	2	0.3	< 2	< 0.5	< 0.1	< 1	< 0.2	< 0.1	< 3	0.10	0.17	< 0.01	0.09	0.03	< 0.005	< 0.01	< 0.01	0.01	< 0.01	0.02
ZE15AC013A	< 1	< 2	< 0.5	2	< 0.2	< 2	< 0.5	< 0.1	< 1	< 0.2	< 0.1	< 3	< 0.05	< 0.05	< 0.01	0.06	0.02	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
ZE15AC020A	< 1	< 2	< 0.5	2	< 0.2	< 2	< 0.5	< 0.1	< 1	< 0.2	< 0.1	< 3	< 0.05	0.08	< 0.01	0.06	< 0.01	< 0.005	0.02	< 0.01	< 0.01	< 0.01	0.03
ZE15AC022A	< 1	< 2	< 0.5	2	0.2	< 2	< 0.5	< 0.1	< 1	< 0.2	< 0.1	< 3	< 0.05	0.06	< 0.01	0.07	0.02	< 0.005	0.01	< 0.01	0.01	< 0.01	0.01
ZE15AC062	3	142	35.0	99	1.0	< 2	< 0.5	< 0.1	< 1	< 0.2	0.2	24	3.12	10.6	1.87	10.3	3.83	1.40	5.32	0.97	6.34	1.33	3.88
ZE15SM014A	5	127	33.6	101	1.6	< 2	< 0.5	< 0.1	< 1	< 0.2	0.2	22	3.50	11.0	1.90	10.5	3.76	1.37	5.12	0.94	6.18	1.31	3.89
ZE15SM014B	< 1	2	0.6	3	0.3	< 2	< 0.5	< 0.1	< 1	< 0.2	< 0.1	< 3	0.09	0.27	0.04	0.23	0.07	0.019	0.06	0.01	0.10	0.02	0.07
ZE15SM023-1	< 1	< 2	< 0.5	< 1	< 0.2	< 2	< 0.5	< 0.1	< 1	< 0.2	< 0.1	< 3	< 0.05	0.10	0.02	0.14	0.05	0.007	0.04	< 0.01	0.07	0.01	0.03
ZE15SM030	5	81	27.2	97	2.2	< 2	< 0.5	< 0.1	< 1	< 0.2	0.3	20	4.35	12.4	1.94	10.1	3.38	1.06	4.34	0.76	5.11	1.04	3.02
ZE15SM031A	3	53	20.7	54	0.8	< 2	< 0.5	< 0.1	< 1	< 0.2	0.1	9	2.02	6.34	1.09	5.90	2.15	0.928	3.17	0.56	3.71	0.80	2.28
ZE15SM033	2	137	19.3	68	0.9	< 2	< 0.5	< 0.1	< 1	0.4	< 0.1	19	2.88	8.51	1.37	7.27	2.40	0.979	3.23	0.54	3.62	0.77	2.21
ZE15SM034-1	< 1	< 2	0.5	2	< 0.2	< 2	< 0.5	< 0.1	< 1	< 0.2	< 0.1	< 3	0.12	0.28	0.03	0.16	0.06	0.012	0.07	0.01	0.07	0.02	0.06
ZE15SM034-2	< 1	< 2	< 0.5	2	< 0.2	< 2	< 0.5	< 0.1	< 1	< 0.2	< 0.1	< 3	0.05	0.15	0.02	0.10	0.08	0.006	0.06	< 0.01	0.03	< 0.01	0.03
ZE15SM038	< 1	< 2	< 0.5	2	< 0.2	< 2	< 0.5	< 0.1	< 1	< 0.2	< 0.1	< 3	0.07	0.14	0.01	0.08	0.03	< 0.005	0.03	< 0.01	0.01	< 0.01	0.02
ZE15SM039B	4	151	31.6	114	2.2	< 2	< 0.5	< 0.1	< 1	< 0.2	0.1	9	4.53	13.7	2.13	11.3	3.91	1.29	4.94	0.92	5.81	1.21	3.47
ZE15SM040	3	94	28.0	81	1.2	< 2	< 0.5	< 0.1	< 1	< 0.2	0.2	49	2.63	8.69	1.51	8.51	2.98	1.08	4.20	0.76	5.01	1.06	3.07
ZE15SM045	< 1	< 2	0.7	3	0.2	< 2	< 0.5	< 0.1	< 1	< 0.2	< 0.1	< 3	0.15	0.31	0.04	0.26	0.06	0.013	0.10	0.01	0.09	0.02	0.08
ZE15SM050	4	27	27.0	78	1.3	< 2	< 0.5	< 0.1	< 1	< 0.2	0.3	< 3	2.85	9.08	1.48	8.35	2.92	1.14	4.16	0.77	4.89	1.02	3.14
ZE15SM054A	< 1	162	20.2	69	0.8	< 2	< 0.5	< 0.1	< 1	< 0.2	< 0.1	27	2.87	8.36	1.35	7.06	2.49	0.920	3.16	0.57	3.60	0.78	2.24
ZE15SM055A	< 1	< 2	< 0.5	2	< 0.2	< 2	< 0.5	< 0.1	< 1	< 0.2	< 0.1	< 3	0.13	0.26	0.03	0.15	0.03	0.006	0.07	0.01	0.09	0.02	0.05
ZE15SM055B	< 1	3	< 0.5	3	< 0.2	< 2	< 0.5	< 0.1	< 1	< 0.2	< 0.1	< 3	< 0.05	0.06	< 0.01	< 0.05	< 0.01	< 0.005	0.01	< 0.01	0.03	< 0.01	0.02
ZE15SM056	< 1	< 2	< 0.5	2	< 0.2	< 2	< 0.5	< 0.1	< 1	< 0.2	< 0.1	< 3	0.06	0.11	< 0.01	< 0.05	< 0.01	< 0.005	< 0.01	< 0.01	0.02	< 0.01	0.03
ZE15SM057	< 1	< 2	< 0.5	1	< 0.2	< 2	< 0.5	< 0.1	< 1	< 0.2	< 0.1	< 3	0.07	0.12	< 0.01	0.06	0.02	< 0.005	0.01	< 0.01	0.03	< 0.01	0.02
ZE15SM090	6	118	28.5	77	0.9	< 2	< 0.5	< 0.1	< 1	< 0.2	0.5	24	2.60	8.51	1.44	8.60	3.09	1.20	4.17	0.81	5.23	1.09	3.20
ZE15SM094	29	934	14.9	133	4.7	< 2	< 0.5	< 0.1	< 1	0.6	0.4	1250	24.8	48.4	5.91	23.2	4.49	1.28	3.47	0.47	2.62	0.50	1.51
ZE15SM105	2	424	37.9	123	3.4	< 2	< 0.5	< 0.1	< 1	< 0.2	0.2	149	6.58	17.9	2.75	13.8	4.52	1.55	6.16	1.03	6.82	1.43	4.11
ZE15SM112A	35	159	18.5	107	18.5	< 2	< 0.5	< 0.1	< 1	< 0.2	2.7	275	21.9	40.9	4.67	19.8	4.41	1.46	4.27	0.62	3.64	0.66	1.81

Results

Analyte Symbol	Tm	Yb	Lu	Hf	Ta	W	Tl	Pb	Bi	Th	U
Unit Symbol	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Lower Limit	0.005	0.01	0.002	0.1	0.01	0.5	0.05	5	0.1	0.05	0.01
Method Code	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS
15ZE933	0.034	0.27	0.043	0.5	0.03	< 0.5	< 0.05	< 5	< 0.1	0.13	0.06
15ZE953	0.348	2.22	0.336	2.0	0.04	0.6	< 0.05	< 5	< 0.1	0.15	0.09
15ZE955	0.229	1.56	0.213	0.9	0.04	0.6	< 0.05	< 5	< 0.1	0.20	0.15
15ZE959A	0.083	0.52	0.075	0.2	< 0.01	< 0.5	< 0.05	35	< 0.1	0.06	0.02
15ZE959B-	0.007	0.06	0.008	< 0.1	< 0.01	0.5	< 0.05	7	< 0.1	< 0.05	< 0.01
15ZE961A	< 0.005	0.02	0.003	< 0.1	< 0.01	< 0.5	< 0.05	< 5	< 0.1	< 0.05	< 0.01
15ZE965	0.037	0.28	0.046	< 0.1	0.05	0.6	< 0.05	11	< 0.1	0.50	0.01
15ZE967A	< 0.005	0.01	0.003	< 0.1	< 0.01	0.8	< 0.05	< 5	< 0.1	< 0.05	< 0.01
15ZE967E	0.010	0.08	0.016	< 0.1	< 0.01	< 0.5	< 0.05	7	< 0.1	< 0.05	< 0.01
ZE15AC009A	< 0.005	< 0.01	< 0.002	< 0.1	< 0.01	1.2	< 0.05	< 5	< 0.1	< 0.05	< 0.01
ZE15AC011A	< 0.005	0.02	0.003	< 0.1	< 0.01	0.6	< 0.05	< 5	< 0.1	< 0.05	< 0.01
ZE15AC013A	< 0.005	0.02	0.005	< 0.1	< 0.01	< 0.5	< 0.05	< 5	< 0.1	< 0.05	< 0.01
ZE15AC020A	0.006	0.04	0.005	< 0.1	< 0.01	< 0.5	< 0.05	< 5	< 0.1	< 0.05	< 0.01
ZE15AC022A	< 0.005	0.01	< 0.002	< 0.1	< 0.01	< 0.5	< 0.05	< 5	< 0.1	< 0.05	< 0.01
ZE15AC062	0.583	3.93	0.584	2.3	< 0.01	0.7	< 0.05	33	< 0.1	0.15	0.10
ZE15SM014A	0.556	3.86	0.601	2.4	0.08	0.5	< 0.05	13	< 0.1	0.15	0.08
ZE15SM014B	0.009	0.06	0.008	< 0.1	< 0.01	0.6	< 0.05	< 5	< 0.1	< 0.05	< 0.01
ZE15SM023-1	0.007	0.06	0.009	< 0.1	< 0.01	< 0.5	< 0.05	< 5	< 0.1	< 0.05	< 0.01
ZE15SM030	0.462	2.87	0.447	2.1	0.13	0.7	< 0.05	< 5	< 0.1	0.22	0.14
ZE15SM031A	0.362	2.34	0.346	1.2	< 0.01	0.6	< 0.05	< 5	< 0.1	0.08	0.12
ZE15SM033	0.346	2.34	0.338	1.6	0.02	< 0.5	< 0.05	28	< 0.1	0.17	0.11
ZE15SM034-1	0.010	0.07	0.010	< 0.1	< 0.01	< 0.5	< 0.05	< 5	< 0.1	< 0.05	< 0.01
ZE15SM034-2	0.006	0.04	0.006	< 0.1	< 0.01	< 0.5	< 0.05	< 5	< 0.1	< 0.05	< 0.01
ZE15SM038	< 0.005	0.03	0.004	< 0.1	< 0.01	< 0.5	< 0.05	< 5	< 0.1	< 0.05	< 0.01
ZE15SM039B	0.506	3.36	0.507	2.4	0.11	< 0.5	< 0.05	< 5	< 0.1	0.21	0.12
ZE15SM040	0.452	2.97	0.471	1.8	0.04	0.5	< 0.05	< 5	< 0.1	0.10	0.05
ZE15SM045	0.012	0.08	0.012	< 0.1	< 0.01	< 0.5	< 0.05	< 5	< 0.1	< 0.05	< 0.01
ZE15SM050	0.458	2.89	0.457	1.7	0.05	0.7	< 0.05	< 5	< 0.1	0.13	0.05
ZE15SM054A	0.356	2.25	0.335	1.6	< 0.01	0.7	< 0.05	< 5	< 0.1	0.18	0.11
ZE15SM055A	0.007	0.06	0.009	< 0.1	< 0.01	0.8	< 0.05	< 5	< 0.1	< 0.05	< 0.01
ZE15SM055B	< 0.005	0.02	0.003	< 0.1	< 0.01	0.6	< 0.05	< 5	< 0.1	< 0.05	< 0.01
ZE15SM056	< 0.005	0.04	0.006	< 0.1	< 0.01	< 0.5	< 0.05	< 5	< 0.1	< 0.05	< 0.01
ZE15SM057	0.007	0.06	0.008	< 0.1	< 0.01	< 0.5	< 0.05	< 5	< 0.1	< 0.05	< 0.01
ZE15SM090	0.487	3.18	0.498	1.8	< 0.01	< 0.5	< 0.05	< 5	< 0.1	0.11	0.07
ZE15SM094	0.224	1.55	0.251	2.5	0.36	< 0.5	0.18	34	< 0.1	3.42	1.19
ZE15SM105	0.589	3.96	0.621	2.8	0.19	< 0.5	< 0.05	7	< 0.1	0.48	0.20
ZE15SM112A	0.235	1.47	0.210	2.1	1.27	1.1	0.07	< 5	< 0.1	1.47	0.52

QC

Analyte Symbol	SiO2	Al2O3	Fe2O3(T)	MnO	MgO	CaO	Na2O	K2O	TiO2	P2O5	LOI	Total	Sc	Be	V	Cr	Co	Ni	Cu	Zn	Ga	Ge	As
Unit Symbol	%	%	%	%	%	%	%	%	%	%	%	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Lower Limit	0.01	0.01	0.01	0.001	0.01	0.01	0.01	0.01	0.001	0.01		0.01	1	1	5	20	1	20	10	30	1	0.5	5
Method Code	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS
NIST 694 Meas	11.34	1.90	0.75	0.013	0.34	42.84	0.86	0.54	0.118	30.20					1627								
NIST 694 Cert	11.2	1.80	0.790	0.0116	0.330	43.6	0.860	0.510	0.110	30.2					1740								
DNC-1 Meas	47.26	17.67	9.43	0.146	9.74	11.44	1.93	0.22	0.471	0.07			31		157	280	53	270	100		16		
DNC-1 Cert	47.15	18.34	9.97	0.150	10.13	11.49	1.890	0.234	0.480	0.070			31		148	270	57	247	100		15		
GBW 07113 Meas	70.98	13.07	3.21	0.143	0.16	0.65	2.52	5.46	0.285	0.04			5	5	7								
GBW 07113 Cert	72.8	13.0	3.21	0.140	0.160	0.590	2.57	5.43	0.300	0.0500			5.00	4.00	5.00								
LKSD-3 Meas																90	31		30	140			26
LKSD-3 Cert																87.0	30.0		35.0	152			27.0
TDB-1 Meas																260		90	350	170			
TDB-1 Cert																251		92	323	155			
W-2a Meas	52.31	15.37	10.64	0.165	6.45	10.95	2.17	0.60	1.076	0.13			35	< 1	267	100	44	70	110	90	18	1.4	
W-2a Cert	52.4	15.4	10.7	0.163	6.37	10.9	2.14	0.626	1.06	0.130			36.0	1.30	262	92.0	43.0	70.0	110	80.0	17.0	1.00	
DTS-2b Meas																> 10000	128	3750					
DTS-2b Cert																15500	120	3780					
SY-4 Meas	50.35	20.84	6.20	0.105	0.50	8.12	6.98	1.64	0.286	0.12			1	3	9								
SY-4 Cert	49.9	20.69	6.21	0.108	0.54	8.05	7.10	1.66	0.287	0.131			1.1	2.6	8.0								
CTA-AC-1 Meas																				60	40		
CTA-AC-1 Cert																				54.0	38.0		
BIR-1a Meas	48.20	15.98	11.40	0.174	10.01	13.54	1.80	0.02	0.980	0.02			43	< 1	334	400	52	180	130		16		
BIR-1a Cert	47.96	15.50	11.30	0.175	9.700	13.30	1.82	0.030	0.96	0.021			44	0.58	310	370	52	170	125		16		
NCS DC86312 Meas																							
NCS DC86312 Cert																							
NCS DC70009 (GBW07241) Meas																30	3		1010	100	18	10.8	66
NCS DC70009 (GBW07241) Cert																30	3.7		960	100	16.5	11.2	69.9
OREAS 100a (Fusion) Meas																	18		180				
OREAS 100a (Fusion) Cert																	18.1		169				
OREAS 101a (Fusion) Meas																	52		480				
OREAS 101a (Fusion) Cert																	48.8		434				
OREAS 101b (Fusion) Meas																	45	< 20	420				
OREAS 101b (Fusion) Cert																	47	9	416				
JR-1 Meas																		< 20	< 10	30	17	1.9	
JR-1 Cert																		1.67	2.68	30.6	16.1	1.88	
ZE15AC062 Orig	53.54	14.02	12.45	0.201	5.18	6.23	5.49	0.21	1.640	0.15	1.58	100.7	33	< 1	296	160	32	100	40	100	18	0.9	< 5
ZE15AC062 Dup	52.97	13.90	12.33	0.199	5.14	6.21	5.47	0.21	1.634	0.16	1.58	99.80	33	< 1	298	160	32	90	40	100	17	1.0	< 5
ZE15SM056 Orig	41.47	0.73	7.76	0.117	41.13	1.37	0.02	< 0.01	0.007	0.01	5.95	98.58	11	< 1	44	2670	110	2340	40	40	< 1	0.5	< 5
ZE15SM056 Dup	41.53	0.72	7.81	0.117	42.31	1.36	0.02	< 0.01	0.007	< 0.01	5.95	99.84	11	< 1	44	2650	109	2340	50	40	< 1	0.6	< 5
Method Blank																< 20	< 1	< 20	< 10	< 30	< 1	< 0.5	< 5

QC

Analyte Symbol	Rb	Sr	Y	Zr	Nb	Mo	Ag	In	Sn	Sb	Cs	Ba	La	Ce	Pr	Nd	Sm	Eu	Gd	Tb	Dy	Ho	Er
Unit Symbol	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Lower Limit	1	2	0.5	1	0.2	2	0.5	0.1	1	0.2	0.1	3	0.05	0.05	0.01	0.05	0.01	0.005	0.01	0.01	0.01	0.01	0.01
Method Code	FUS-MS	FUS-ICP	FUS-MS	FUS-ICP	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-ICP	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS
NIST 694 Meas																							
NIST 694 Cert																							
DNC-1 Meas		139	17.7	37						0.9		102						0.630					
DNC-1 Cert		144.0	18.0	38						0.96		118						0.59					
GBW 07113 Meas		40		401								513											
GBW 07113 Cert		43.0		403								506											
LKSD-3 Meas	82		30.9			2	2.5		2		2.5		50.5	95.4		46.6	8.70	1.40		0.90	5.20		
LKSD-3 Cert	78.0		30.0			2.00	2.70		3.00		2.30		52.0	90.0		44.0	8.00	1.50		1.00	4.90		
TDB-1 Meas	21		35.8										17.8	41.4		25.3		2.20					
TDB-1 Cert	23		36										17	41		23		2.1					
W-2a Meas	20	192	21.7	95	7.3	< 2	1.0					170		24.8		13.3	3.40			0.64		0.81	2.30
W-2a Cert	21.0	190	24.0	94.0	7.90	0.600	0.0460					182		23.0		13.0	3.30			0.630		0.760	2.50
DTS-2b Meas																							
DTS-2b Cert																							
SY-4 Meas		1206		532								342											
SY-4 Cert		1191		517								340											
CTA-AC-1 Meas			285										> 2000	> 3000		1140	162	44.7	128	13.8			
CTA-AC-1 Cert			272										2176	3326		1087	162	46.7	124	13.9			
BIR-1a Meas		108	16.0	16						0.6		4	0.70			2.50		0.570	2.00			2.80	
BIR-1a Cert		110	16	18						0.58		6	0.63			2.5		0.55	2.0			4	
NCS DC86312 Meas			1010										> 2000	190		1700				34.3	196	37.1	
NCS DC86312 Cert			976										2360	190		1600				34.6	183	36	
NCS DC70009 (GBW07241) Meas	537		129			1.9	1.0	> 1000	3.0	43.1		24.4	61.4	8.20	33.9	13.1		15.6	3.20	21.7	4.40	13.8	
NCS DC70009 (GBW07241) Cert	500		128			1.8	1.3	1701	3.1	41		23.7	60.3	7.9	32.9	12.5		14.8	3.3	20.7	4.5	13.4	
OREAS 100a (Fusion) Meas			141			24						277	499	49.2	158	25.1	3.76	22.3	3.68	23.5	4.93	15.6	
OREAS 100a (Fusion) Cert			142			24.1						260	463	47.1	152	23.6	3.71	23.6	3.80	23.2	4.81	14.9	
OREAS 101a (Fusion) Meas			192			22						844	1520	137	415	52.1	8.45	39.4	5.58	33.7	6.76		
OREAS 101a (Fusion) Cert			183			21.9						816	1396	134	403	48.8	8.06	43.4	5.92	33.3	6.46		
OREAS 101b (Fusion) Meas			180			20						820	1430	129	389	50.0	8.34		5.46	32.5	6.44	19.4	
OREAS 101b (Fusion) Cert			178			20.9						789	1331	127	378	48	7.77		5.37	32.1	6.34	18.7	
JR-1 Meas	245		46.0		14.5	3	1.0	< 0.1	3	1.3	19.7		19.7	46.5	5.90	23.4	5.82	0.280		0.94		1.21	
JR-1 Cert	257		45.1		15.2	3.25	0.031	0.028	2.86	1.19	20.8		19.7	47.2	5.58	23.3	6.03	0.30		1.01		1.11	
ZE15AC062 Orig	3	143	35.1	101	1.1	< 2	< 0.5	< 0.1	< 1	< 0.2	0.2	24	3.13	10.5	1.85	10.2	3.66	1.38	5.24	0.94	6.16	1.32	3.84
ZE15AC062 Dup	3	142	35.0	96	1.0	< 2	< 0.5	< 0.1	< 1	< 0.2	0.2	24	3.11	10.7	1.89	10.4	3.99	1.43	5.41	1.00	6.51	1.34	3.92
ZE15SM056 Orig	< 1	< 2	< 0.5	3	< 0.2	< 2	< 0.5	< 0.1	< 1	< 0.2	< 0.1	< 3	0.07	0.10	< 0.01	< 0.05	< 0.01	< 0.005	< 0.01	< 0.01	0.03	< 0.01	0.03
ZE15SM056 Dup	< 1	< 2	< 0.5	2	< 0.2	< 2	< 0.5	< 0.1	< 1	< 0.2	< 0.1	< 3	0.06	0.13	0.02	0.08	0.03	0.007	0.02	< 0.01	0.02	< 0.01	0.03
Method Blank	< 1		< 0.5		< 0.2	< 2	< 0.5	< 0.1	< 1	< 0.2	< 0.1		< 0.05	< 0.05	< 0.01	< 0.05	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01

QC

Analyte Symbol	Tm	Yb	Lu	Hf	Ta	W	Tl	Pb	Bi	Th	U
Unit Symbol	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Lower Limit	0.005	0.01	0.002	0.1	0.01	0.5	0.05	5	0.1	0.05	0.01
Method Code	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS
NIST 694 Meas											
NIST 694 Cert											
DNC-1 Meas		2.10									
DNC-1 Cert		2.0									
GBW 07113 Meas											
GBW 07113 Cert											
LKSD-3 Meas		2.80	0.440	4.6	0.75					10.7	4.80
LKSD-3 Cert		2.70	0.400	4.80	0.700					11.4	4.60
TDB-1 Meas		3.50									
TDB-1 Cert		3.4									
W-2a Meas		2.10	0.320	2.5		< 0.5	0.06		< 0.1	2.50	0.55
W-2a Cert		2.10	0.330	2.60		0.300	0.200		0.0300	2.40	0.530
DTS-2b Meas											
DTS-2b Cert											
SY-4 Meas											
SY-4 Cert											
CTA-AC-1 Meas		10.4	1.12		2.80					21.8	4.00
CTA-AC-1 Cert		11.4	1.08		2.65					21.8	4.4
BIR-1a Meas		1.80	0.310	0.6							
BIR-1a Cert		1.7	0.3	0.60							
NCS DC86312 Meas	14.3	91.5									
NCS DC86312 Cert	15.1	87.79									
NCS DC70009 (GBW07241) Meas	2.30	15.9	2.38			2170		79		28.4	
NCS DC70009 (GBW07241) Cert	2.2	14.9	2.4			2200		81.2		28.3	
OREAS 100a (Fusion) Meas	2.33	15.4	2.31							50.7	139
OREAS 100a (Fusion) Cert	2.31	14.9	2.26							51.6	135
OREAS 101a (Fusion) Meas	2.90	19.1	2.69							36.0	438
OREAS 101a (Fusion) Cert	2.90	17.5	2.66							36.6	422
OREAS 101b (Fusion) Meas	2.82	18.2	2.63							39.8	426
OREAS 101b (Fusion) Cert	2.66	17.6	2.58							37.1	396
JR-1 Meas	0.660	4.70	0.720	4.2			1.50	19	0.6	24.3	8.50
JR-1 Cert	0.67	4.55	0.71	4.51			1.56	19.3	0.56	26.7	8.88
ZE15AC062 Orig	0.574	3.91	0.585	2.3	0.02	0.8	< 0.05	33	< 0.1	0.15	0.10
ZE15AC062 Dup	0.592	3.95	0.583	2.2	< 0.01	0.6	< 0.05	32	< 0.1	0.15	0.10
ZE15SM056 Orig	0.008	0.06	0.008	< 0.1	< 0.01	< 0.5	< 0.05	< 5	< 0.1	< 0.05	< 0.01
ZE15SM056 Dup	< 0.005	0.03	0.004	< 0.1	< 0.01	< 0.5	< 0.05	< 5	< 0.1	< 0.05	< 0.01
Method Blank	< 0.005	< 0.01	< 0.002	< 0.1	< 0.01	< 0.5	< 0.05	< 5	< 0.1	< 0.05	< 0.01