Quality Analysis ... *Innovative Technologies*

Date Submitted: 23-Aug-18
Invoice No.: A18-11448
Invoice Date: 20-Nov-18
Your Reference: 3000672915

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

ATTN: Alex Zagorevski

CERTIFICATE OF ANALYSIS

28 Rock samples were submitted for analysis.

The following analytical package(s) were requested: Code 4LITHORES (11+) Major Elements Fusion ICP(WRA)/Trace Elements Fusion ICP/MS(WRA4B2)

REPORT **A18-11448**

 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:

Emmanuel Eseme , Ph.D.
Quality Control

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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
18ZE1370A	48.76	16.12	7.19	0.128	10.43	13.24	2.15	0.21	0.309	< 0.01	2.04	100.6	51	< 1	142	760	32	180	10	40	11	1.1	< 5
18ZE1370C	41.12	3.52	7.84	0.115	34.99	2.73	0.08	0.01	0.103	< 0.01	9.47	99.99	17	< 1	69	2410	88	1650	20	40	3	0.9	29
18ZE1361	39.86	1.21	7.41	0.122	40.05	1.68	0.05	< 0.01	0.010	< 0.01	8.70	99.10	11	< 1	39	2570	98	1990	< 10	40	1	0.9	< 5
18ZE1362A	38.84	0.22	7.59	0.102	47.85	0.10	0.01	< 0.01	0.004	0.01	5.20	99.94	3	< 1	7	2880	115	2500	< 10	50	< 1	0.7	< 5
18ZE1362B	40.46	0.68	7.87	0.116	42.15	0.67	0.03	< 0.01	0.005	< 0.01	6.82	98.80	9	< 1	28	2610	104	2140	< 10	40	< 1	0.7	< 5
18ZE1363	40.64	0.80	8.66	0.122	43.74	0.99	0.08	< 0.01	0.006	< 0.01	5.12	100.2	9	< 1	30	2360	108	2170	< 10	40	< 1	0.9	< 5
18ZE1351	45.05	14.47	9.36	0.156	13.14	8.67	1.18	1.37	1.090	0.17	5.79	100.4	36	< 1	203	1000	52	310	< 10	70	13	1.1	< 5
18ZE1352	45.62	16.48	10.95	0.147	10.39	5.54	3.73	0.08	1.593	0.27	5.56	100.4	38	< 1	231	430	48	200	80	80	15	0.8	< 5
18ZE1355	48.84	16.69	11.90	0.096	8.48	3.95	3.61	1.06	1.482	0.19	4.36	100.7	44	< 1	201	420	36	150	< 10	70	16	1.2	< 5
18ZE1356	43.42	14.49	10.62	0.145	10.20	11.01	1.13	1.05	1.123	0.18	5.82	99.20	34	< 1	198	830	52	250	170	80	14	1.5	< 5
18ZE1358	48.84	15.14	9.50	0.166	9.25	10.13	1.64	1.02	0.957	0.15	3.76	100.6	41	< 1	233	550	43	130	60	70	14	1.3	< 5
18ZE1360	44.82	12.04	11.80	0.185	5.20	11.12	1.78	1.15	1.509	0.15	10.89	100.6	34	< 1	270	200	46	100	110	70	15	1.2	< 5
18ZE1364	49.40	15.04	7.68	0.143	6.04	9.76	4.50	0.09	0.325	0.06	6.77	99.80	35	< 1	188	420	37	120	130	60	11	0.9	< 5
18ZE1370B	48.33	15.01	5.94	0.104	12.56	14.88	0.97	0.12	0.328	0.11	2.10	100.5	31	< 1	115	890	40	200	< 10	< 30	9	0.9	< 5
18ZE1371A	54.33	14.94	10.07	0.153	3.57	6.80	4.08	0.16	1.052	0.24	3.83	99.22	29	< 1	283	40	25	< 20	140	80	19	1.7	< 5
18ZE1371B	53.55	15.91	10.04	0.145	3.73	6.69	4.70	0.17	1.008	0.21	4.35	100.5	29	< 1	292	20	23	< 20	140	80	18	1.6	< 5
18ZE1371C	53.90	15.06	11.31	0.177	3.65	7.65	3.11	0.16	1.174	0.28	3.10	99.56	31	< 1	285	40	27	20	170	100	19	1.6	< 5
18ZE1372	47.10	16.72	13.02	0.206	7.00	9.68	2.89	0.22	0.853	0.07	2.87	100.6	44	< 1	298	120	47	50	110	90	16	1.4	< 5
18ZE1365	62.35	14.94	7.01	0.079	3.84	3.51	3.21	0.94	0.475	0.05	2.80	99.22	27	< 1	127	280	25	90	80	120	15	1.4	< 5
18ZE1366	47.68	15.37	9.11	0.120	4.96	9.60	2.85	1.67	0.580	0.11	8.20	100.3	31	< 1	214	240	32	60	60	100	14	1.1	11
18ZE1369A	52.34	15.26	5.41	0.141	2.94	8.90	5.54	1.88	0.498	0.14	6.89	99.93	17	1	162	80	14	< 20	30	70	20	0.9	< 5
18ZE1369B	55.49	16.11	7.12	0.110	3.64	4.38	5.91	0.91	0.737	0.21	5.12	99.74	22	< 1	219	120	19	< 20	40	90	21	1.1	< 5
18ZE1370C-2	40.38	3.64	7.98	0.118	35.79	2.84	0.09	0.01	0.108	< 0.01	9.44	100.4	17	< 1	69	2570	89	1710	20	50	3	1.0	28
18ZE1373A	57.79	17.48	5.84	0.116	2.60	5.99	4.38	2.23	0.546	0.25	2.00	99.22	16	2	117	60	12	< 20	20	60	20	1.2	< 5
18ZE1373B	57.65	16.65	6.94	0.116	3.02	5.79	3.76	2.31	0.654	0.23	2.87	99.98	16	1	144	50	12	< 20	20	80	19	1.1	< 5
18ZE1371A-2	54.44	15.34	10.94	0.162	3.83	6.78	3.85	0.19	1.150	0.25	3.60	100.5	30	< 1	294	40	26	20	140	100	20	1.5	< 5
18ZE1374	65.30	14.40	5.11	0.073	2.00	3.33	4.01	2.11	0.435	0.15	2.24	99.15	11	1	114	80	11	< 20	30	60	17	0.8	< 5
18ZE1375	57.37	14.69	8.05	0.107	4.05	5.13	3.83	2.08	0.681	0.20	3.48	99.66	27	< 1	204	190	21	30	60	70	16	1.6	< 5

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	2	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
18ZE1370A	2	199	6.2	9	< 0.2	< 2	< 0.5	< 0.1	< 1	0.2	0.1	93	0.51	1.65	0.27	1.61	0.61	0.384	0.94	0.17	1.05	0.21	0.60
18ZE1370C	< 1	6	2.8	3	< 0.2	< 2	< 0.5	< 0.1	< 1	0.7	0.4	4	< 0.05	0.05	0.02	0.18	0.15	0.088	0.29	0.06	0.44	0.10	0.32
18ZE1361	< 1	5	< 0.5	2	< 0.2	< 2	< 0.5	< 0.1	< 1	< 0.2	< 0.1	6	< 0.05	< 0.05	< 0.01	< 0.05	0.01	0.007	0.02	< 0.01	0.03	< 0.01	0.05
18ZE1362A	< 1	< 2	< 0.5	2	< 0.2	< 2	< 0.5	< 0.1	< 1	< 0.2	< 0.1	3	< 0.05	< 0.05	< 0.01	< 0.05	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	0.02
18ZE1362B	< 1	< 2	< 0.5	2	< 0.2	< 2	< 0.5	< 0.1	< 1	< 0.2	< 0.1	3	< 0.05	< 0.05	< 0.01	< 0.05	< 0.01	0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
18ZE1363	< 1	< 2	< 0.5	2	< 0.2	< 2	< 0.5	< 0.1	< 1	< 0.2	< 0.1	3	< 0.05	< 0.05	< 0.01	< 0.05	< 0.01	0.008	0.01	< 0.01	0.02	< 0.01	0.02
18ZE1351	11	200	20.6	70	12.2	< 2	< 0.5	< 0.1	< 1	< 0.2	< 0.1	215	8.80	19.2	2.48	11.1	2.98	1.06	3.48	0.57	3.45	0.73	2.04
18ZE1352	< 1	118	26.2	109	20.6	< 2	< 0.5	< 0.1	1	< 0.2	< 0.1	44	14.6	30.8	3.75	17.3	4.34	1.43	4.45	0.75	4.71	0.92	2.65
18ZE1355	11	126	30.5	96	14.9	< 2	< 0.5	< 0.1	< 1	< 0.2	0.1	245	13.9	31.4	3.86	17.6	4.57	1.63	4.96	0.88	5.60	1.13	3.41
18ZE1356	9	302	19.9	69	13.1	< 2	< 0.5	< 0.1	< 1	< 0.2	< 0.1	232	9.47	20.4	2.64	11.5	3.06	1.05	2.97	0.53	3.48	0.73	2.05
18ZE1358	13	204	20.2	54	8.6	< 2	< 0.5	< 0.1	< 1	< 0.2	< 0.1	272	6.32	14.3	1.85	8.10	2.34	0.939	2.86	0.52	3.25	0.68	2.04
18ZE1360	10	42	26.9	73	3.0	< 2	< 0.5	< 0.1	< 1	< 0.2	0.1	124	5.26	14.5	2.12	11.5	3.66	1.29	4.48	0.75	4.51	0.91	2.58
18ZE1364	< 1	138	11.6	25	0.2	< 2	< 0.5	< 0.1	< 1	< 0.2	0.1	28	0.98	2.65	0.44	2.65	0.92	0.344	1.34	0.26	1.69	0.37	1.23
18ZE1370B	1	490	8.6	26	1.1	< 2	< 0.5	< 0.1	< 1	< 0.2	0.2	54	4.41	10.6	1.56	6.87	1.73	0.603	1.61	0.24	1.36	0.28	0.84
18ZE1371A	2	489	26.4	111	3.9	< 2	< 0.5	< 0.1	1	0.4	< 0.1	104	12.4	30.0	4.15	19.0	4.61	1.39	4.30	0.75	4.53	0.89	2.65
18ZE1371B	2	390	23.7	102	3.6	< 2	< 0.5	< 0.1	< 1	0.3	< 0.1	120	10.5	25.5	3.57	15.9	4.03	1.38	4.07	0.66	4.12	0.81	2.42
18ZE1371C	2	476	30.6	137	5.3	< 2	< 0.5	< 0.1	1	0.5	< 0.1	102	15.9	36.4	4.97	22.4	5.20	1.57	5.18	0.87	5.41	1.06	3.04
18ZE1372	3	136	17.9	35	0.9	< 2	< 0.5	< 0.1	< 1	< 0.2	0.2	87	2.06	5.20	0.87	4.83	1.83	0.668	2.44	0.43	2.92	0.65	1.92
18ZE1365	16	179	19.7	68	1.1	< 2	< 0.5	< 0.1	< 1	1.1	0.3	958	5.08	11.1	1.81	7.89	2.59	0.664	2.76	0.54	3.28	0.67	2.08
18ZE1366	29	379	19.3	38	1.2	< 2	< 0.5	< 0.1	< 1	0.4	0.8	1118	4.83	8.04	1.30	6.38	1.89	0.710	2.43	0.46	2.90	0.64	1.97
18ZE1369A	26	788	10.5	73	2.8	< 2	< 0.5	< 0.1	< 1	< 0.2	1.0	6351	8.90	18.9	2.44	10.4	2.42	0.635	2.18	0.31	1.86	0.36	0.96
18ZE1369B	13	668	11.2	104	3.9	< 2	< 0.5	< 0.1	< 1	< 0.2	0.6	6195	10.3	23.2	3.06	13.2	3.11	0.826	2.20	0.38	2.02	0.41	1.23
18ZE1370C-2	< 1	8	2.9	3	< 0.2	< 2	< 0.5	< 0.1	< 1	1.1	0.3	19	< 0.05	0.07	0.03	0.25	0.18	0.089	0.30	0.07	0.48	0.10	0.33
18ZE1373A	50	992	17.8	89	4.3	< 2	< 0.5	< 0.1	< 1	0.5	2.1	1281	17.1	34.0	4.22	16.9	3.98	1.21	3.21	0.54	3.17	0.61	1.79
18ZE1373B	51	905	17.9	97	4.9	< 2	< 0.5	< 0.1	1	0.4	2.0	1195	16.9	33.7	4.24	17.2	3.53	1.09	3.13	0.54	3.15	0.58	1.75
18ZE1371A-2	3	648	30.0	138	4.8	< 2	< 0.5	< 0.1	1	0.6	< 0.1	108	14.1	34.0	4.76	22.2	5.13	1.56	5.24	0.80	5.14	1.01	3.05
18ZE1374	48	789	11.6	68	2.5	< 2	< 0.5	< 0.1	< 1	0.2	1.4	1984	14.5	27.5	3.24	12.9	2.50	0.806	2.29	0.32	1.93	0.38	1.13
18ZE1375	43	389	14.6	56	2.3	< 2	< 0.5	< 0.1	< 1	0.7	0.6	797	11.0	22.1	2.92	13.2	3.04	1.05	2.91	0.44	2.57	0.49	1.47

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
18ZE1370A	0.091	0.56	0.083	0.2	0.01	< 0.5	< 0.05	< 5	< 0.1	0.07	0.02
18ZE1370C	0.054	0.40	0.062	< 0.1	< 0.01	< 0.5	< 0.05	< 5	< 0.1	< 0.05	< 0.01
18ZE1361	0.011	0.08	0.009	< 0.1	< 0.01	< 0.5	< 0.05	< 5	< 0.1	< 0.05	< 0.01
18ZE1362A	< 0.005	0.02	0.003	< 0.1	< 0.01	< 0.5	< 0.05	< 5	< 0.1	< 0.05	< 0.01
18ZE1362B	< 0.005	0.04	0.005	< 0.1	< 0.01	< 0.5	< 0.05	< 5	< 0.1	< 0.05	< 0.01
18ZE1363	< 0.005	0.03	0.004	< 0.1	< 0.01	< 0.5	< 0.05	< 5	< 0.1	< 0.05	< 0.01
18ZE1351	0.323	2.03	0.308	1.7	0.82	< 0.5	< 0.05	< 5	< 0.1	0.97	0.15
18ZE1352	0.368	2.34	0.361	2.6	1.45	< 0.5	< 0.05	< 5	< 0.1	1.67	0.43
18ZE1355	0.493	3.37	0.524	2.4	1.13	< 0.5	< 0.05	< 5	< 0.1	1.29	0.54
18ZE1356	0.298	1.94	0.308	1.8	0.96	< 0.5	< 0.05	5	< 0.1	1.07	0.34
18ZE1358	0.306	2.11	0.347	1.4	0.64	< 0.5	< 0.05	< 5	< 0.1	0.70	0.17
18ZE1360	0.368	2.24	0.323	1.8	0.18	< 0.5	< 0.05	< 5	< 0.1	0.23	0.07
18ZE1364	0.188	1.26	0.203	0.7	< 0.01	< 0.5	< 0.05	< 5	< 0.1	0.18	0.80
18ZE1370B	0.124	0.85	0.134	0.7	0.06	< 0.5	< 0.05	< 5	< 0.1	1.52	0.25
18ZE1371A	0.394	2.63	0.409	2.8	0.34	< 0.5	< 0.05	6	< 0.1	2.11	0.78
18ZE1371B	0.352	2.32	0.347	2.6	0.28	0.8	< 0.05	7	< 0.1	1.69	0.66
18ZE1371C	0.447	3.01	0.471	3.6	0.45	< 0.5	< 0.05	5	< 0.1	2.36	0.90
18ZE1372	0.280	1.90	0.292	0.9	0.06	< 0.5	< 0.05	< 5	< 0.1	0.15	0.10
18ZE1365	0.311	2.16	0.358	1.7	0.12	< 0.5	< 0.05	< 5	< 0.1	1.12	0.65
18ZE1366	0.308	2.09	0.327	1.0	0.08	< 0.5	0.28	< 5	< 0.1	0.48	0.71
18ZE1369A	0.139	0.96	0.156	1.7	0.17	< 0.5	0.17	5	< 0.1	1.28	0.94
18ZE1369B	0.181	1.12	0.167	2.4	0.28	< 0.5	0.10	5	< 0.1	1.58	1.32
18ZE1370C-2	0.049	0.35	0.058	< 0.1	< 0.01	< 0.5	< 0.05	< 5	< 0.1	< 0.05	< 0.01
18ZE1373A	0.274	1.87	0.255	2.3	0.36	21.9	0.19	9	< 0.1	3.59	1.60
18ZE1373B	0.266	1.77	0.275	2.2	0.36	< 0.5	0.20	10	< 0.1	3.97	1.75
18ZE1371A-2	0.436	2.95	0.458	3.6	0.37	< 0.5	< 0.05	6	< 0.1	2.36	0.92
18ZE1374	0.179	1.19	0.184	1.6	0.27	< 0.5	0.28	8	< 0.1	3.76	1.42
18ZE1375	0.234	1.34	0.231	1.5	0.20	< 0.5	0.17	7	< 0.1	1.76	1.15

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	11.09	1.87	0.77	0.020	0.34	42.90	0.88	0.54	0.120	30.20					1545								
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	47.37	18.22	9.94	0.146	10.10	11.52	1.95	0.23	0.478	0.06			31		147	270	54	260	100	70	14		
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	70	15		
DNC-1 Meas	47.22	18.27	9.73	0.150	9.90	11.45	1.92	0.22	0.480	0.09			31		148								
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								
GBW 07113 Meas	71.10	12.72	3.23	0.140	0.14	0.59	2.46	5.42	0.280	0.05			6	4	< 5								
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		50	40	160			26
LKSD-3 Cert																87.0		47.0	35.0	152			27.0
TDB-1 Meas																250			330	150			
TDB-1 Cert																251			323	155			
W-2a Meas	52.63	15.37	10.78	0.164	6.36	11.06	2.25	0.64	1.082	0.12			35	< 1	259	90	43	70	110	80	17	1.5	
W-2a Cert	52.4	15.4	10.7	0.163	6.37	10.9	2.14	0.626	1.06	0.140			36.0	1.30	262	92.0	43.0	70.0	110	80.0	17.0	1.00	
W-2a Meas	52.68	15.61	10.46	0.170	6.28	11.07	2.20	0.62	1.070	0.13			35	< 1	260								
W-2a Cert	52.4	15.4	10.7	0.163	6.37	10.9	2.14	0.626	1.06	0.140			36.0	1.30	262								
SY-4 Meas	50.29	20.32	6.15	0.107	0.51	8.19	6.85	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								
SY-4 Meas	49.90	20.43	6.27	0.110	0.50	8.14	6.91	1.66	0.290	0.12			< 1	3	11								
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																							
CTA-AC-1 Cert																							
BIR-1a Meas	48.15	15.83	11.51	0.168	9.72	13.53	1.83	0.02	0.981	0.02			44	< 1	319	370	52	180	130	70			
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	70			
BIR-1a Meas	47.85	15.48	11.11	0.170	9.42	13.46	1.83	0.02	0.970	0.03			43	< 1	317								
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								
NCS DC86312 Meas																							
NCS DC86312 Cert																							
NCS DC70009 (GBW07241) Meas																	3		970	100	18	10.7	64
NCS DC70009 (GBW07241) Cert																	3.7		960	100	16.5	11.2	69.9
OREAS 100a (Fusion) Meas																	19		180				
OREAS 100a (Fusion) Cert																	18.1		169				
OREAS 101a (Fusion) Meas																	52		460				
OREAS 101a (Fusion) Cert																	48.8		430				

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
OREAS 101b (Fusion) Meas																	45		420				
OREAS 101b (Fusion) Cert																	47		420				
JR-1 Meas																	1	< 20		< 30	18	1.9	15
JR-1 Cert																	0.83	1.67		30.6	16.1	1.88	16.3
18ZE1371A Orig	54.70	15.00	10.08	0.155	3.59	6.87	4.08	0.17	1.062	0.24	3.83	99.76	29	< 1	285	40	25	< 20	140	80	19	1.7	< 5
18ZE1371A Dup	53.97	14.87	10.06	0.151	3.54	6.73	4.09	0.16	1.042	0.24	3.83	98.68	29	< 1	282	40	24	20	140	80	19	1.7	< 5
18ZE1375 Orig	57.37	14.69	8.05	0.107	4.05	5.13	3.83	2.08	0.681	0.20	3.48	99.66	27	< 1	204	190	21	30	60	70	16	1.6	< 5
18ZE1375 Split PREP DUP	57.04	14.42	7.97	0.108	4.05	5.11	3.78	2.06	0.679	0.20	3.47	98.88	27	< 1	202	190	22	30	50	70	16	1.5	< 5
Method Blank	0.01	< 0.01	< 0.01	0.007	< 0.01	0.01	< 0.01	< 0.01	< 0.001	< 0.01		0.05	< 1	< 1	< 5	< 20	< 1	< 20	< 10	< 30	< 1	< 0.5	< 5
Method Blank	0.01	< 0.01	< 0.01	0.007	< 0.01	< 0.01	< 0.01	< 0.01	< 0.001	< 0.01			< 1	< 1	< 5								
Method Blank	0.01	< 0.01	< 0.01	0.006	< 0.01	< 0.01	< 0.01	< 0.01	< 0.001	< 0.01			< 1	< 1	< 5								

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	2	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	4	145	18.4	36						0.9		109	3.80			5.40		0.640					
DNC-1 Cert	5	144.0	18.0	38						0.96		118	3.6			5.20		0.59					
DNC-1 Meas		143		35								109											
DNC-1 Cert		144.0		38								118											
GBW 07113 Meas		41		387								495											
GBW 07113 Cert		43.0		403								506											
LKSD-3 Meas	81		30.5			< 2	2.5				2.4		50.2	94.5		47.3	8.70	1.60		0.90	5.20		
LKSD-3 Cert	78.0		30.0			2.00	2.70				2.30		52.0	90.0		44.0	8.00	1.50		1.00	4.90		
TDB-1 Meas			34.4										17.2	40.2		24.2		2.10					
TDB-1 Cert			36										17	41		23		2.1					
W-2a Meas	19	200	20.9	105	8.0	< 2						177	11.0	23.8		13.0	3.30			0.61	3.90	0.78	
W-2a Cert	21.0	190	24.0	94.0	7.90	0.600						182	10.0	23.0		13.0	3.30			0.630	3.60	0.760	
W-2a Meas		196		88								178											
W-2a Cert		190		94.0								182											
SY-4 Meas		1186		506								345											
SY-4 Cert		1191		517								340											
SY-4 Meas		1197		542								344											
SY-4 Cert		1191		517								340											
CTA-AC-1 Meas			287										> 2000	> 3000		1150	168	49.4	131	13.5			
CTA-AC-1 Cert			272										2176	3326		1087	162	46.7	124	13.9			
BIR-1a Meas		111	16.5	16						0.5		10	0.60	1.90		2.40		0.570	2.10				
BIR-1a Cert		110	16	18						0.58		6	0.63	1.9		2.5		0.55	2.0				
BIR-1a Meas		108		14								11											
BIR-1a Cert		110		18								6											
NCS DC86312 Meas			1060										> 2000	185		1690				35.2	188	35.1	94.4
NCS DC86312 Cert			976										2360	190		1600				34.6	183	36	96.2
NCS DC70009 (GBW07241) Meas	503		137				1.7		> 1000	3.2	40.1		25.2	63.4	8.10	34.2	12.2		15.1	3.40		4.80	13.4
NCS DC70009 (GBW07241) Cert	500		128				1.8		1700	3.1	41		23.7	60.3	7.9	32.9	12.5		14.8	3.3		4.5	13.4
OREAS 100a (Fusion) Meas			152			24							270	485	49.5	151		3.91	22.7	3.78		5.21	
OREAS 100a (Fusion) Cert			142			24.1							260	463	47.1	152		3.71	23.6	3.80		4.81	
OREAS 101a (Fusion) Meas			192			21							825	1400	138	419		8.77		5.63	35.9		20.3
OREAS 101a (Fusion) Cert			183			21.9							816	1396	134	403		8.06		5.92	33.3		19.5

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	2	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
OREAS 101b (Fusion) Meas			175			20							798	1390	126	379	49.0	8.05		5.02	31.8	6.30	18.8
OREAS 101b (Fusion) Cert			178			21							789	1331	127	378	48	7.77		5.37	32.1	6.34	18.7
JR-1 Meas	260		44.9		14.2	3		< 0.1	3	1.2	21.9		21.0	49.8	6.00		6.14	0.300	5.30	1.07	6.01	1.10	3.86
JR-1 Cert	257		45.1		15.2	3.25		0.028	2.86	1.19	20.8		19.7	47.2	5.58		6.03	0.30	5.06	1.01	5.69	1.11	3.61
18ZE1371A Orig	2	488	26.4	113	3.4	< 2	< 0.5	< 0.1	1	0.5	< 0.1	103	12.5	29.8	4.08	19.3	4.38	1.42	4.27	0.76	4.62	0.90	2.70
18ZE1371A Dup	2	490	26.4	109	4.3	< 2	< 0.5	< 0.1	1	0.4	< 0.1	104	12.3	30.2	4.23	18.7	4.83	1.35	4.32	0.73	4.44	0.89	2.60
18ZE1375 Orig	43	389	14.6	56	2.3	< 2	< 0.5	< 0.1	< 1	0.7	0.6	797	11.0	22.1	2.92	13.2	3.04	1.05	2.91	0.44	2.57	0.49	1.47
18ZE1375 Split PREP DUP	43	383	14.7	57	2.2	< 2	< 0.5	< 0.1	< 1	0.6	0.6	791	10.8	22.1	2.88	12.8	3.19	1.04	2.80	0.44	2.67	0.50	1.50
Method Blank	< 1	< 2	< 0.5	2	< 0.2	< 2	< 0.5	< 0.1	< 1	< 0.2	< 0.1	< 2	< 0.05	< 0.05	< 0.01	< 0.05	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Method Blank		< 2		1								< 2											
Method Blank		< 2		2								2											

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								6			
DNC-1 Cert								6.3			
DNC-1 Meas											
DNC-1 Cert											
GBW 07113 Meas											
GBW 07113 Cert											
LKSD-3 Meas		2.80		4.6	0.69					11.7	4.70
LKSD-3 Cert		2.70		4.80	0.700					11.4	4.60
TDB-1 Meas		3.20								2.50	
TDB-1 Cert		3.4								2.7	
W-2a Meas		2.00	0.310		0.46	< 0.5	0.06	8	< 0.1		0.54
W-2a Cert		2.10	0.330		0.500	0.300	0.200	9.30	0.0300		0.530
W-2a Meas											
W-2a Cert											
SY-4 Meas											
SY-4 Cert											
SY-4 Meas											
SY-4 Cert											
CTA-AC-1 Meas		12.1	1.01	1.2						22.7	4.40
CTA-AC-1 Cert		11.4	1.08	1.13						21.8	4.4
BIR-1a Meas		1.80		0.6				< 5			
BIR-1a Cert		1.7		0.60				3			
BIR-1a Meas											
BIR-1a Cert											
NCS DC86312 Meas	14.9	86.2	11.5							25.1	
NCS DC86312 Cert	15.1	87.79	11.96							23.6	
NCS DC70009 (GBW07241) Meas		16.1	2.57			2260	2.01			30.3	
NCS DC70009 (GBW07241) Cert		14.9	2.4			2200	1.8			28.3	
OREAS 100a (Fusion) Meas	2.47	15.5	2.37							52.3	136
OREAS 100a (Fusion) Cert	2.31	14.9	2.26							51.6	135
OREAS 101a (Fusion) Meas	3.10	18.3	2.80							38.4	425
OREAS 101a (Fusion) Cert	2.90	17.5	2.66							36.6	422

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
OREAS 101b (Fusion) Meas	2.72	17.7	2.55							35.7	411
OREAS 101b (Fusion) Cert	2.66	17.6	2.58							37.1	396
JR-1 Meas	0.730	4.42	0.750	4.7	1.94		1.52	20	0.5	28.5	8.70
JR-1 Cert	0.67	4.55	0.71	4.51	1.86		1.56	19.3	0.56	26.7	8.88
18ZE1371A Orig	0.397	2.68	0.416	2.9	0.35	< 0.5	< 0.05	6	< 0.1	2.11	0.75
18ZE1371A Dup	0.390	2.57	0.402	2.8	0.34	< 0.5	< 0.05	6	< 0.1	2.10	0.82
18ZE1375 Orig	0.234	1.34	0.231	1.5	0.20	< 0.5	0.17	7	< 0.1	1.76	1.15
18ZE1375 Split PREP DUP	0.233	1.45	0.235	1.6	0.19	< 0.5	0.20	7	< 0.1	1.85	1.12
Method Blank	< 0.005	< 0.01	< 0.002	< 0.1	< 0.01	< 0.5	< 0.05	< 5	< 0.1	< 0.05	< 0.01
Method Blank											
Method Blank											