



Date Submitted: 19-Dec-13
Invoice No.: A13-14909
Invoice Date: 10-Jan-14
Your Reference: CATS HMC

MINNESOTA DEPT OF NAT RESOURCES
500 LAFAYETTE RD BOX 45
ST PAUL MN 55155-4045
United States

ATTN: Don Elsenheimer

CERTIFICATE OF ANALYSIS

102 Heavy Mineral Concentrates samples were submitted for analysis.

The following analytical packages were requested:

REPORT A13-14909

- Code 1C-Exp Fire Assay-ICP/MS
Code 3A-Large HMC INAA(INAAGEO)
Code 3A-Medium HMC INAA(INAAGEO)
Code 3A-Small HMC INAA(INAAGEO)
Code 4F-S Infrared
Code 4LITHORES (11+) Major Elements Fusion ICP(WRA)/Trace Elements Fusion ICP/MS(WRA4B2)

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Notes:

We recommend reanalysis by fire assay Au, Pt, Pd Code 8 if values exceed upper limit. 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 :

[Handwritten signature]

Emmanuel Esemé , Ph.D.
Quality Control



ACTIVATION LABORATORIES LTD.

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Analyte Symbol	Pd	Pt	Au	Au	Ag	As	Ba	Br	Ca	Co	Cr	Cs	Fe	Hf	Hg	Ir	Mo	Na	Ni	Rb	Sb	Sc	Se	Sr
Unit Symbol	ppb	ppb	ppb	ppb	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	%	ppm	ppm	ppb	ppm	%	ppm	ppm	ppm	ppm	ppm	%
Detection Limit	1	1	2	5	5	2	200	5	1	5	10	2	0.02	1	5	50	20	0.05	200	50	0.2	0.1	20	0.2
Analysis Method	FA-MS	FA-MS	FA-MS	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA
CATS-13-201	< 1	< 1	3																					
CATS-13-202	< 1	< 1	< 2																					
CATS-13-203	< 1	< 1	< 2																					
CATS-13-204	< 1	< 1	< 2																					
CATS-13-205	< 1	< 1	2																					
CATS-13-206	< 1	< 1	2																					
CATS-13-207	< 1	< 1	4																					
CATS-13-208	< 1	< 1	3																					
CATS-13-209	< 1	< 1	< 2																					
CATS-13-210	< 1	< 1	< 2																					
CATS-13-211	< 1	< 1	< 2																					
CATS-13-212	< 1	< 1	< 2																					
CATS-13-213	< 1	< 1	3																					
CATS-13-214	< 1	1	< 2																					
CATS-13-215	< 1	< 1	< 2																					
CATS-13-216	< 1	< 1	< 2																					
CATS-13-217	< 1	< 1	3																					
CATS-13-218	< 1	< 1	< 2																					
CATS-13-219	< 1	< 1	< 2																					
CATS-13-220	< 1	< 1	9																					
CATS-13-221	< 1	< 1	8																					
CATS-13-222	< 1	< 1	2																					
CATS-13-223	< 1	< 1	< 2																					
CATS-13-224	< 1	< 1	3																					
CATS-13-225	< 1	< 1	< 2																					
CATS-13-226	< 1	< 1	< 2																					
CATS-13-227	< 1	< 1	< 2																					
CATS-13-228	< 1	1	5																					
CATS-13-229	< 1	< 1	< 2																					
CATS-13-230	< 1	< 1	2																					
CATS-13-231	< 1	< 1	< 2																					
CATS-13-232	< 1	1	< 2																					
CATS-13-233	< 1	< 1	< 2																					
CATS-13-234	< 1	< 1	< 2																					
CATS-13-201-NM HMC				182	< 5	38	< 200	< 5	< 1	61	260	< 2	41.7	19	< 5	< 50	< 20	0.20	< 200	< 50	2.8	17.4	< 20	< 0.2
CATS-13-202-NM HMC																								
CATS-13-203-NM HMC																								
CATS-13-204-NM HMC																								
CATS-13-205-NM HMC																								
CATS-13-206-NM HMC																								
CATS-13-207-NM HMC																								
CATS-13-208-NM HMC																								
CATS-13-209-NM HMC																								
CATS-13-210-NM HMC																								
CATS-13-211-NM HMC				28	< 5	< 2	< 200	< 5	< 1	50	1770	< 2	20.8	305	< 5	< 50	< 20	0.33	< 200	< 50	1.1	68.8	< 20	< 0.2
CATS-13-212-NM HMC				1020	< 5	85	< 200	< 5	< 1	114	1170	< 2	32.9	119	< 5	< 50	< 20	0.24	< 200	< 50	4.3	59.1	< 20	< 0.2
CATS-13-213-NM HMC				< 5	< 5	66	< 200	< 5	< 1	95	980	< 2	28.7	145	< 5	< 50	< 20	0.22	< 200	< 50	3.4	63.0	< 20	< 0.2
CATS-13-214-NM HMC																								
CATS-13-215-NM HMC																								
CATS-13-216-NM HMC																								
CATS-13-217-NM HMC																								
CATS-13-218-NM HMC																								

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Analyte Symbol	Pd	Pt	Au	Au	Ag	As	Ba	Br	Ca	Co	Cr	Cs	Fe	Hf	Hg	Ir	Mo	Na	Ni	Rb	Sb	Sc	Se	Sr
Unit Symbol	ppb	ppb	ppb	ppb	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	%	ppm	ppm	ppb	ppm	%	ppm	ppm	ppm	ppm	ppm	%
Detection Limit	1	1	2	5	5	2	200	5	1	5	10	2	0.02	1	5	50	20	0.05	200	50	0.2	0.1	20	0.2
Analysis Method	FA-MS	FA-MS	FA-MS	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA

CATS-13-219-NM HMC																									
CATS-13-220-NM HMC																									
CATS-13-221-NM HMC																									
CATS-13-222-NM HMC																									
CATS-13-223-NM HMC																									
CATS-13-224-NM HMC				< 5	< 5	40	< 200	< 5	< 1	63	1330	< 2	23.4	308	< 5	< 50	< 20	0.28	< 200	< 50	< 0.2	73.7	< 20	< 0.2	
CATS-13-225-NM HMC				98	< 5	< 2	< 200	< 5	< 1	93	460	< 2	23.7	70	< 5	< 50	< 20	0.17	< 200	< 50	< 0.2	45.5	< 20	< 0.2	
CATS-13-226-NM HMC																									
CATS-13-227-NM HMC				< 5	< 5	< 2	< 200	< 5	< 1	65	750	< 2	19.5	74	< 5	< 50	< 20	0.21	< 200	< 50	< 0.2	60.5	< 20	< 0.2	
CATS-13-228-NM HMC				51	< 5	< 2	< 200	< 5	< 1	83	390	< 2	19.7	38	< 5	< 50	< 20	0.10	< 200	< 50	< 0.2	38.2	< 20	< 0.2	
CATS-13-229-NM HMC				70	< 5	< 2	< 200	< 5	< 1	70	560	< 2	19.5	46	< 5	< 50	< 20	0.14	< 200	< 50	< 0.2	53.1	< 20	< 0.2	
CATS-13-230-NM HMC				28	< 5	10	< 200	< 5	< 1	91	390	< 2	20.9	33	< 5	< 50	< 20	0.20	< 200	< 50	< 0.2	47.9	< 20	< 0.2	
CATS-13-231-NM HMC				24	< 5	< 2	< 200	< 5	< 1	77	550	< 2	22.3	44	< 5	< 50	< 20	0.15	< 200	< 50	< 0.2	1.1	48.0	< 20	< 0.2
CATS-13-232-NM HMC				< 5	< 5	14	< 200	< 5	< 1	87	500	< 2	22.0	38	< 5	< 50	< 20	0.16	< 200	< 50	< 0.2	53.8	< 20	< 0.2	
CATS-13-233-NM HMC				< 5	< 5	< 2	< 200	< 5	< 1	373	710	< 2	23.4	331	< 5	< 50	< 20	0.26	< 200	< 50	0.3	69.3	< 20	< 0.2	
CATS-13-234-NM HMC				< 5	< 5	18	< 200	< 5	< 1	72	560	< 2	26.0	62	< 5	< 50	< 20	0.27	< 200	< 50	0.9	58.6	< 20	< 0.2	
CATS-13-201-MHMC				< 5	< 5	5	< 200	< 5	< 1	15	220	< 2	58.6	< 1	< 5	< 50	< 20	< 0.05	< 200	< 50	0.6	2.0	< 20	< 0.2	
CATS-13-202-MHMC																									
CATS-13-203-MHMC																									
CATS-13-204-MHMC				< 5	< 5	15	< 200	< 5	< 1	46	680	< 2	53.7	3	< 5	< 50	< 20	0.07	< 200	< 50	1.3	3.5	< 20	< 0.2	
CATS-13-205-MHMC				< 5	< 5	8	< 200	< 5	< 1	23	840	< 2	53.3	< 1	< 5	< 50	< 20	0.07	< 200	< 50	< 0.2	2.6	< 20	< 0.2	
CATS-13-206-MHMC																									
CATS-13-207-MHMC				< 5	< 5	5	< 200	< 5	< 1	99	12500	< 2	61.8	11	< 5	< 50	< 20	0.09	< 200	< 50	1.4	11.6	< 20	< 0.2	
CATS-13-208-MHMC				< 5	< 5	49	< 200	< 5	< 1	190	26300	< 2	66.7	< 1	< 5	< 50	< 20	< 0.05	< 200	< 50	< 0.2	20.7	< 20	< 0.2	
CATS-13-209-MHMC				< 5	< 5	7	< 200	< 5	< 1	65	3690	< 2	62.8	6	< 5	< 50	< 20	< 0.05	< 200	< 50	0.6	4.3	< 20	< 0.2	
CATS-13-210-MHMC				< 5	< 5	< 2	< 200	< 5	< 1	236	76300	< 2	56.6	14	< 5	< 50	< 20	0.11	< 200	< 50	5.0	31.9	< 20	< 0.2	
CATS-13-211-MHMC				< 5	< 5	< 2	< 200	< 5	< 1	54	11200	< 2	77.5	16	< 5	< 50	< 20	0.07	< 200	< 50	< 0.2	4.9	< 20	< 0.2	
CATS-13-212-MHMC				< 5	< 5	26	< 200	< 5	< 1	71	4020	< 2	64.8	3	< 5	< 50	< 20	0.15	< 200	< 50	1.5	6.7	< 20	< 0.2	
CATS-13-213-MHMC				< 5	< 5	< 2	< 200	< 5	< 1	51	4270	< 2	68.0	5	< 5	< 50	< 20	0.11	< 200	< 50	< 0.2	6.0	< 20	< 0.2	
CATS-13-214-MHMC				< 5	< 5	< 2	< 200	< 5	< 1	79	5710	< 2	59.7	4	< 5	< 50	< 20	0.12	< 200	< 50	0.8	9.6	< 20	< 0.2	
CATS-13-215-MHMC				< 5	< 5	9	< 200	< 5	< 1	103	14800	< 2	65.4	5	< 5	< 50	< 20	0.08	< 200	< 50	< 0.2	14.7	< 20	< 0.2	
CATS-13-216-MHMC				< 5	< 5	13	< 200	< 5	< 1	93	11100	< 2	68.4	5	< 5	< 50	< 20	0.07	< 200	< 50	< 0.2	11.2	< 20	< 0.2	
CATS-13-217-MHMC																									
CATS-13-218-MHMC				< 5	< 5	12	< 200	< 5	< 1	20	610	< 2	55.7	< 1	< 5	< 50	< 20	0.08	< 200	< 50	0.7	2.9	< 20	< 0.2	
CATS-13-219-MHMC																									
CATS-13-220-MHMC				< 5	< 5	13	< 200	< 5	< 1	26	1390	< 2	58.0	2	< 5	< 50	< 20	0.07	< 200	< 50	1.2	3.2	< 20	< 0.2	
CATS-13-221-MHMC																									
CATS-13-222-MHMC																									
CATS-13-223-MHMC				< 5	< 5	40	< 200	< 5	< 1	85	3830	< 2	65.3	3	< 5	< 50	< 20	0.08	< 200	< 50	1.8	7.7	< 20	< 0.2	
CATS-13-224-MHMC				< 5	< 5	< 2	< 200	< 5	< 1	148	5460	< 2	60.2	< 1	< 5	< 50	< 20	< 0.05	< 200	< 50	1.8	10.6	< 20	< 0.2	
CATS-13-225-MHMC																									
CATS-13-226-MHMC				< 5	< 5	< 2	< 200	< 5	< 1	166	14600	< 2	48.8	8	< 5	< 50	< 20	0.06	< 200	< 50	< 0.2	16.8	< 20	< 0.2	
CATS-13-227-MHMC				< 5	< 5	< 2	< 200	< 5	< 1	231	51600	< 2	48.2	14	< 5	< 50	< 20	< 0.05	1600	< 50	< 0.2	27.3	< 20	< 0.2	
CATS-13-228-MHMC																									
CATS-13-229-MHMC				< 5	< 5	< 2	< 200	< 5	< 1	140	13000	< 2	38.9	7	< 5	< 50	< 20	0.08	< 200	< 50	0.9	16.1	< 20	< 0.2	
CATS-13-230-MHMC																									
CATS-13-231-MHMC				< 5	< 5	4	< 200	< 5	< 1	111	8090	< 2	42.6	6	< 5	< 50	< 20	0.06	< 200	< 50	< 0.2	12.5	< 20	< 0.2	
CATS-13-232-MHMC				< 5	< 5	< 2	< 200	< 5	< 1	98	5390	< 2	42.5	7	< 5	< 50	< 20	0.08	< 200	< 50	0.6	12.6	< 20	< 0.2	
CATS-13-233-MHMC				< 5	< 5	18	< 200	< 5	< 1	793	1930	< 2	59.2	7	< 5	< 50	< 20	0.17	< 200	< 50	2.9	8.4	< 20	< 0.2	
CATS-13-234-MHMC				< 5	< 5	9	< 200	< 5	< 1	70	1810	< 2	52.6	6	< 5	< 50	< 20	0.07	< 200	< 50	1.0	6.1	< 20	< 0.2	

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Analyte Symbol	Ta	Th	U	W	Zn	La	Ce	Nd	Sm	Eu	Tb	Yb	Lu	Mass	Au	Ag	As	Ba	Br	Ca	Co	Cr	Cs	Fe
Unit Symbol	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	g	ppb	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	%
Detection Limit	1	0.5	0.5	4	200	1	3	10	0.1	0.2	2	0.2	0.05		5	5	2	200	5	1	5	10	2	0.02
Analysis Method	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA

CATS-13-201
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 CATS-13-232
 CATS-13-233
 CATS-13-234

CATS-13-201-NM HMC	< 1	96.2	9.5	< 4	< 200	211	435	190	24.5	3.1	< 2	5.3	0.32	20.9										
CATS-13-202-NM HMC															< 5	< 5	56	< 200	< 5	< 1	37	300	< 2	43.2
CATS-13-203-NM HMC															< 5	< 5	31	< 200	< 5	< 1	30	400	< 2	43.5
CATS-13-204-NM HMC															< 5	< 5	26	< 200	< 5	< 1	20	600	< 2	34.7
CATS-13-205-NM HMC															< 5	< 5	30	< 200	< 5	< 1	33	710	< 2	39.5
CATS-13-206-NM HMC															337	< 5	103	< 200	< 5	< 1	51	140	< 2	56.7
CATS-13-207-NM HMC															1050	< 5	46	< 200	< 5	< 1	46	1680	10	23.0
CATS-13-208-NM HMC															338	< 5	< 2	< 200	< 5	< 1	21	1060	< 2	20.7
CATS-13-209-NM HMC															< 5	< 5	62	< 200	< 5	< 1	64	820	< 2	26.5
CATS-13-210-NM HMC															< 5	< 5	< 2	< 200	< 5	< 1	31	1550	< 2	19.1
CATS-13-211-NM HMC	< 1	769	31.8	< 4	< 200	1380	3020	1760	158	18.0	< 2	33.9	1.60	1.78										
CATS-13-212-NM HMC	32	542	26.0	< 4	< 200	792	1740	1040	92.9	8.4	< 2	33.1	1.32	1.76										
CATS-13-213-NM HMC	24	513	19.7	< 4	< 200	647	1490	830	81.2	7.9	< 2	28.2	1.44	1.27										
CATS-13-214-NM HMC															< 5	< 5	40	< 200	< 5	< 1	61	770	< 2	27.2
CATS-13-215-NM HMC															< 5	< 5	< 2	< 200	< 5	< 1	67	780	< 2	31.9
CATS-13-216-NM HMC															3710	< 5	37	< 200	< 5	< 1	46	770	< 2	24.6
CATS-13-217-NM HMC															364	< 5	42	< 200	< 5	< 1	37	220	< 2	39.1
CATS-13-218-NM HMC															2030	< 5	31	< 200	< 5	< 1	21	350	< 2	43.4

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Analyte Symbol	Ta	Th	U	W	Zn	La	Ce	Nd	Sm	Eu	Tb	Yb	Lu	Mass	Au	Ag	As	Ba	Br	Ca	Co	Cr	Cs	Fe
Unit Symbol	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	g	ppb	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	%
Detection Limit	1	0.5	0.5	4	200	1	3	10	0.1	0.2	2	0.2	0.05		5	5	2	200	5	1	5	10	2	0.02
Analysis Method	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA
CATS-13-219-NM HMC															74	< 5	32	< 200	< 5	< 1	22	320	< 2	40.4
CATS-13-220-NM HMC															132	< 5	26	< 200	< 5	< 1	33	590	< 2	41.2
CATS-13-221-NM HMC															2170	< 5	30	< 200	< 5	< 1	34	240	< 2	41.2
CATS-13-222-NM HMC															< 5	< 5	26	< 200	< 5	< 1	42	370	< 2	37.1
CATS-13-223-NM HMC															< 5	< 5	80	< 200	< 5	< 1	79	1200	< 2	29.4
CATS-13-224-NM HMC	< 1	434	25.9	< 4	< 200	789	2110	1120	124	17.3	< 2	36.5	1.65	0.211										
CATS-13-225-NM HMC	< 1	116	8.7	< 4	< 200	255	511	180	30.5	4.0	< 2	12.3	0.35	30.0										
CATS-13-226-NM HMC															< 5	< 5	< 2	< 200	< 5	< 1	61	720	< 2	23.3
CATS-13-227-NM HMC	< 1	63.3	11.6	< 4	< 200	163	335	100	22.0	4.0	< 2	12.1	0.44	29.8										
CATS-13-228-NM HMC	< 1	43.4	< 0.5	< 4	< 200	110	218	80	14.0	2.7	< 2	6.3	0.11	49.8										
CATS-13-229-NM HMC	< 1	30.7	5.8	< 4	< 200	81	176	60	12.3	2.9	< 2	6.7	< 0.05	46.6										
CATS-13-230-NM HMC	< 1	51.9	< 0.5	< 4	< 200	130	259	110	17.1	2.3	< 2	7.4	0.25	45.2										
CATS-13-231-NM HMC	< 1	35.8	< 0.5	< 4	< 200	100	192	200	14.5	2.5	< 2	6.7	0.26	29.2										
CATS-13-232-NM HMC	< 1	56.7	< 0.5	< 4	< 200	135	273	110	18.7	3.8	< 2	8.5	0.22	22.5										
CATS-13-233-NM HMC	< 1	291	22.0	< 4	< 200	376	884	620	57.4	8.7	< 2	18.5	1.04	0.813										
CATS-13-234-NM HMC	24	309	16.8	< 4	< 200	447	965	610	58.7	6.7	< 2	21.8	0.92	3.33										
CATS-13-201-MHMC	< 1	7.0	< 0.5	< 4	< 200	11	26	< 10	1.3	0.6	< 2	< 0.2	0.07	24.9										
CATS-13-202-MHMC															< 5	< 5	16	< 200	< 5	< 1	18	480	< 2	56.0
CATS-13-203-MHMC															41	< 5	6	< 200	< 5	< 1	17	490	< 2	65.5
CATS-13-204-MHMC	< 1	14.0	< 0.5	< 4	< 200	22	56	30	2.9	0.4	< 2	< 0.2	< 0.05	1.71										
CATS-13-205-MHMC	< 1	17.6	< 0.5	< 4	< 200	20	46	30	2.5	0.4	< 2	< 0.2	< 0.05	2.01										
CATS-13-206-MHMC															< 5	< 5	20	< 200	< 5	< 1	30	290	< 2	69.4
CATS-13-207-MHMC	< 1	43.3	< 0.5	< 4	2100	49	157	80	7.2	1.0	< 2	< 0.2	< 0.05	0.602										
CATS-13-208-MHMC	< 1	492	14.7	< 4	< 200	663	1560	800	69.2	3.4	< 2	< 0.2	< 0.05	0.0674										
CATS-13-209-MHMC	< 1	17.4	2.6	< 4	300	15	45	< 10	1.9	< 0.2	< 2	< 0.2	< 0.05	1.96										
CATS-13-210-MHMC	< 1	62.7	< 0.5	< 4	3400	109	393	< 10	16.5	< 0.2	< 2	< 0.2	< 0.05	0.145										
CATS-13-211-MHMC	< 1	22.4	8.9	< 4	300	19	75	< 10	5.8	1.8	< 2	1.9	< 0.05	0.403										
CATS-13-212-MHMC	< 1	23.5	< 0.5	< 4	400	33	71	30	4.6	1.2	< 2	1.5	< 0.05	1.26										
CATS-13-213-MHMC	< 1	50.7	6.3	< 4	400	39	100	20	4.8	< 0.2	< 2	< 0.2	< 0.05	0.900										
CATS-13-214-MHMC	< 1	6.3	< 0.5	< 4	400	12	35	10	2.2	0.3	< 2	1.2	< 0.05	1.91										
CATS-13-215-MHMC	< 1	10.0	< 0.5	< 4	500	13	36	30	2.5	< 0.2	< 2	2.8	< 0.05	0.556										
CATS-13-216-MHMC	< 1	23.9	4.6	< 4	700	32	75	< 10	4.4	< 0.2	< 2	< 0.2	< 0.05	0.584										
CATS-13-217-MHMC															< 5	< 5	6	< 200	< 5	< 1	15	350	< 2	62.0
CATS-13-218-MHMC	< 1	1.8	< 0.5	< 4	< 200	7	16	< 10	1.0	< 0.2	< 2	0.9	0.10	2.23										
CATS-13-219-MHMC															< 5	< 5	6	< 200	< 5	< 1	22	720	< 2	63.9
CATS-13-220-MHMC	< 1	5.0	< 0.5	< 4	< 200	10	22	< 10	1.3	< 0.2	< 2	1.0	0.08	2.36										
CATS-13-221-MHMC															< 5	< 5	< 2	< 200	< 5	< 1	11	250	< 2	54.2
CATS-13-222-MHMC															< 5	< 5	18	< 200	< 5	< 1	25	590	16	68.5
CATS-13-223-MHMC	< 1	11.7	3.0	< 4	500	20	57	20	3.5	0.6	< 2	2.0	0.20	0.830										
CATS-13-224-MHMC	< 1	10.8	< 0.5	< 4	1800	19	< 3	< 10	2.7	< 0.2	< 2	< 0.2	< 0.05	0.0307										
CATS-13-225-MHMC															< 5	< 5	< 2	< 200	< 5	< 1	79	3740	< 2	57.5
CATS-13-226-MHMC	< 1	4.0	< 0.5	< 4	1100	8	42	< 10	1.3	< 0.2	< 2	< 0.2	< 0.05	1.29										
CATS-13-227-MHMC	< 1	27.9	< 0.5	< 4	1100	26	292	50	4.5	< 0.2	< 2	< 0.2	< 0.05	0.811										
CATS-13-228-MHMC															< 5	< 5	< 2	< 200	< 5	< 1	90	4550	< 2	53.6
CATS-13-229-MHMC	< 1	7.2	< 0.5	< 4	900	9	87	< 10	1.5	< 0.2	< 2	< 0.2	< 0.05	2.89										
CATS-13-230-MHMC															< 5	< 5	< 2	< 200	< 5	< 1	79	4350	< 2	53.8
CATS-13-231-MHMC	< 1	8.1	< 0.5	< 4	600	9	57	20	1.5	< 0.2	< 2	< 0.2	< 0.05	3.39										
CATS-13-232-MHMC	2	8.5	2.0	< 4	600	14	48	< 10	1.9	< 0.2	< 2	0.9	< 0.05	3.77										
CATS-13-233-MHMC	< 1	155	< 0.5	< 4	< 200	< 1	81	< 10	4.5	< 0.2	< 2	< 0.2	< 0.05	0.307										
CATS-13-234-MHMC	< 1	14.2	1.8	< 4	300	17	37	20	2.2	0.2	< 2	< 0.2	< 0.05	2.54										

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Analyte Symbol	Hf	Hg	Ir	Mo	Na	Ni	Rb	Sb	Sc	Se	Sr	Ta	Th	U	W	Zn	La	Ce	Nd	Sm	Eu	Tb	Yb	Lu
Unit Symbol	ppm	ppm	ppb	ppm	%	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Detection Limit	1	5	50	20	0.05	200	50	0.2	0.1	20	0.2	1	0.5	0.5	4	200	1	3	10	0.1	0.2	2	0.2	0.05
Analysis Method	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA

CATS-13-201
CATS-13-202
CATS-13-203
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CATS-13-226
CATS-13-227
CATS-13-228
CATS-13-229
CATS-13-230
CATS-13-231
CATS-13-232
CATS-13-233
CATS-13-234

CATS-13-201-NM HMC																								
CATS-13-202-NM HMC	16	< 5	< 50	< 20	0.09	< 200	< 50	1.8	21.1	< 20	< 0.2	< 1	55.1	< 0.5	< 4	< 200	135	322	100	19.5	2.3	< 2	5.3	0.31
CATS-13-203-NM HMC	43	< 5	< 50	< 20	0.16	< 200	< 50	< 0.2	29.6	< 20	< 0.2	< 1	109	< 0.5	< 4	< 200	244	577	160	36.7	4.8	< 2	10.4	0.46
CATS-13-204-NM HMC	102	< 5	< 50	< 20	0.15	< 200	< 50	< 0.2	39.7	< 20	< 0.2	< 1	127	23.7	< 4	< 200	310	667	170	45.3	5.2	< 2	18.9	0.73
CATS-13-205-NM HMC	130	< 5	< 50	< 20	0.20	< 200	< 50	< 0.2	45.6	< 20	< 0.2	< 1	181	< 0.5	< 4	< 200	421	785	320	66.8	6.2	< 2	< 0.2	0.58
CATS-13-206-NM HMC	12	< 5	< 50	< 20	0.16	< 200	< 50	3.4	16.5	< 20	< 0.2	< 1	40.9	< 0.5	< 4	< 200	94	244	< 10	16.8	2.7	< 2	3.4	0.32
CATS-13-207-NM HMC	176	< 5	< 50	< 20	< 0.05	< 200	< 50	< 0.2	60.7	< 20	< 0.2	< 1	326	13.6	< 4	< 200	740	1890	480	114	9.6	< 2	29.5	1.11
CATS-13-208-NM HMC	318	< 5	< 50	< 20	0.19	< 200	< 50	< 0.2	56.5	< 20	< 0.2	< 1	408	22.7	< 4	< 200	928	1920	790	128	15.6	< 2	38.3	2.00
CATS-13-209-NM HMC	225	< 5	< 50	< 20	0.25	< 200	< 50	< 0.2	61.1	< 20	< 0.2	< 1	310	9.4	< 4	< 200	706	1710	460	106	14.7	< 2	22.4	1.44
CATS-13-210-NM HMC	229	< 5	< 50	< 20	0.29	< 200	< 50	< 0.2	77.6	< 20	< 0.2	< 1	317	12.6	< 4	< 200	789	1930	560	118	14.0	< 2	29.4	1.64
CATS-13-211-NM HMC																								
CATS-13-212-NM HMC																								
CATS-13-213-NM HMC																								
CATS-13-214-NM HMC	233	< 5	< 50	< 20	0.15	< 200	< 50	< 0.2	56.5	< 20	< 0.2	25	179	15.4	< 4	< 200	428	1050	300	69.9	9.5	4	27.3	1.08
CATS-13-215-NM HMC	253	< 5	< 50	< 20	0.18	< 200	< 50	< 0.2	48.6	< 20	< 0.2	< 1	48.4	13.9	< 4	< 200	143	319	110	24.4	5.2	< 2	14.2	1.06
CATS-13-216-NM HMC	230	< 5	< 50	< 20	0.28	< 200	< 50	< 0.2	64.9	< 20	< 0.2	20	233	11.3	< 4	< 200	566	1420	360	84.9	10.7	< 2	26.4	1.09
CATS-13-217-NM HMC	21	< 5	< 50	< 20	< 0.05	< 200	< 50	1.7	22.6	< 20	< 0.2	< 1	43.7	4.7	< 4	< 200	103	243	50	15.1	2.6	< 2	5.8	0.34
CATS-13-218-NM HMC	52	< 5	< 50	< 20	0.16	< 200	< 50	2.0	34.8	< 20	< 0.2	< 1	54.3	< 0.5	< 4	< 200	145	397	120	23.9	2.9	< 2	8.3	0.31

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Analyte Symbol	Hf	Hg	Ir	Mo	Na	Ni	Rb	Sb	Sc	Se	Sr	Ta	Th	U	W	Zn	La	Ce	Nd	Sm	Eu	Tb	Yb	Lu
Unit Symbol	ppm	ppm	ppb	ppm	%	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Detection Limit	1	5	50	20	0.05	200	50	0.2	0.1	20	0.2	1	0.5	0.5	4	200	1	3	10	0.1	0.2	2	0.2	0.05
Analysis Method	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA
CATS-13-219-NM HMC	31	< 5	< 50	< 20	0.11	< 200	< 50	1.2	35.4	< 20	< 0.2	< 1	35.3	< 0.5	< 4	< 200	88	217	100	14.7	2.6	< 2	6.6	0.32
CATS-13-220-NM HMC	94	< 5	< 50	< 20	0.17	< 200	< 50	< 0.2	46.2	< 20	< 0.2	< 1	92.5	8.1	< 4	< 200	228	568	200	35.2	4.8	< 2	12.1	0.58
CATS-13-221-NM HMC	21	< 5	< 50	< 20	0.11	< 200	< 50	1.7	17.0	< 20	< 0.2	< 1	45.0	3.0	< 4	< 200	117	270	80	16.8	3.5	< 2	4.6	0.36
CATS-13-222-NM HMC	51	< 5	< 50	< 20	0.15	< 200	< 50	3.4	51.9	< 20	< 0.2	< 1	68.2	< 0.5	< 4	< 200	162	432	130	27.4	4.0	< 2	8.1	0.35
CATS-13-223-NM HMC	104	< 5	< 50	< 20	0.21	< 200	< 50	3.0	51.6	< 20	< 0.2	< 1	258	15.9	< 4	< 200	574	1490	360	88.4	6.9	< 2	20.9	1.00
CATS-13-224-NM HMC																								
CATS-13-225-NM HMC																								
CATS-13-226-NM HMC	96	< 5	< 50	< 20	0.14	< 200	< 50	2.0	50.8	< 20	< 0.2	8	38.7	6.2	< 4	< 200	100	243	110	17.0	2.7	< 2	8.1	0.44
CATS-13-227-NM HMC																								
CATS-13-228-NM HMC																								
CATS-13-229-NM HMC																								
CATS-13-230-NM HMC																								
CATS-13-231-NM HMC																								
CATS-13-232-NM HMC																								
CATS-13-233-NM HMC																								
CATS-13-234-NM HMC																								
CATS-13-201-MHMC																								
CATS-13-202-MHMC	< 1	< 5	< 50	< 20	0.06	< 200	< 50	< 0.2	2.5	< 20	< 0.2	< 1	5.0	< 0.5	< 4	< 200	12	29	< 10	1.8	0.8	< 2	< 0.2	0.06
CATS-13-203-MHMC	< 1	< 5	< 50	< 20	0.09	< 200	< 50	< 0.2	3.3	< 20	< 0.2	< 1	2.2	< 0.5	< 4	< 200	< 1	26	< 10	1.6	< 0.2	< 2	< 0.2	< 0.05
CATS-13-204-MHMC																								
CATS-13-205-MHMC																								
CATS-13-206-MHMC	< 1	< 5	< 50	< 20	0.10	< 200	< 50	< 0.2	3.7	< 20	< 0.2	< 1	5.6	< 0.5	< 4	< 200	< 1	< 3	< 10	2.0	< 0.2	< 2	< 0.2	< 0.05
CATS-13-207-MHMC																								
CATS-13-208-MHMC																								
CATS-13-209-MHMC																								
CATS-13-210-MHMC																								
CATS-13-211-MHMC																								
CATS-13-212-MHMC																								
CATS-13-213-MHMC																								
CATS-13-214-MHMC																								
CATS-13-215-MHMC																								
CATS-13-216-MHMC																								
CATS-13-217-MHMC	< 1	< 5	< 50	< 20	0.06	< 200	< 50	< 0.2	2.0	< 20	< 0.2	< 1	1.5	< 0.5	< 4	< 200	< 1	16	< 10	0.9	< 0.2	< 2	< 0.2	< 0.05
CATS-13-218-MHMC																								
CATS-13-219-MHMC	< 1	< 5	< 50	< 20	0.06	< 200	< 50	< 0.2	2.6	< 20	< 0.2	< 1	1.7	< 0.5	< 4	< 200	6	< 3	< 10	1.3	< 0.2	< 2	< 0.2	< 0.05
CATS-13-220-MHMC																								
CATS-13-221-MHMC	< 1	< 5	< 50	< 20	0.05	< 200	< 50	0.8	2.1	< 20	< 0.2	< 1	2.5	< 0.5	< 4	< 200	7	18	< 10	1.0	< 0.2	< 2	< 0.2	0.08
CATS-13-222-MHMC	< 1	< 5	< 50	< 20	0.09	< 200	< 50	< 0.2	2.5	< 20	< 0.2	< 1	1.5	< 0.5	< 4	< 200	< 1	< 3	< 10	1.3	< 0.2	< 2	< 0.2	< 0.05
CATS-13-223-MHMC																								
CATS-13-224-MHMC																								
CATS-13-225-MHMC	4	< 5	< 50	< 20	< 0.05	< 200	< 50	< 0.2	9.4	< 20	< 0.2	< 1	3.7	< 0.5	< 4	600	7	23	< 10	1.3	< 0.2	< 2	< 0.2	0.06
CATS-13-226-MHMC																								
CATS-13-227-MHMC																								
CATS-13-228-MHMC	5	< 5	< 50	< 20	0.05	< 200	< 50	< 0.2	11.4	< 20	< 0.2	< 1	2.9	< 0.5	< 4	600	< 1	27	< 10	1.6	< 0.2	< 2	< 0.2	< 0.05
CATS-13-229-MHMC																								
CATS-13-230-MHMC	7	< 5	< 50	< 20	0.10	< 200	< 50	1.6	12.9	< 20	< 0.2	< 1	6.9	< 0.5	< 4	600	< 1	34	< 10	3.3	0.5	< 2	< 0.2	< 0.05
CATS-13-231-MHMC																								
CATS-13-232-MHMC																								
CATS-13-233-MHMC																								
CATS-13-234-MHMC																								

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Analyte Symbol	Mass	Total S	SiO2	Al2O3	Fe2O3(T)	MnO	MgO	CaO	Na2O	K2O	TiO2	P2O5	LOI	Total	Sc	Be	V	Cr	Co	Ni	Cu	Zn	Ga	Ge
Unit Symbol	g	%	%	%	%	%	%	%	%	%	%	%	%	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Detection Limit		0.01	0.01	0.01	0.01	0.001	0.01	0.01	0.01	0.01	0.001	0.01	0.01	0.01	1	1	5	20	1	20	10	30	1	0.5
Analysis Method	INAA	IR	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
CATS-13-201		0.02	61.66	13.15	7.21	0.148	2.10	1.64	2.16	1.85	0.680	0.14	7.22	97.97	12	1	106	120	19	80	40	70	16	1.7
CATS-13-202		0.02	66.61	12.15	4.25	0.095	1.33	1.65	1.90	1.95	0.810	0.13	7.04	97.93	9	1	100	80	11	30	10	80	15	1.6
CATS-13-203		0.02	64.69	13.69	6.18	0.074	1.81	2.01	2.31	1.75	0.764	0.15	6.27	99.69	11	2	115	110	13	50	50	60	15	1.5
CATS-13-204		0.01	67.33	11.92	4.56	0.089	1.23	1.61	1.77	1.81	0.863	0.18	6.73	98.09	9	2	100	80	13	40	20	300	15	1.7
CATS-13-205		0.02	66.38	12.33	4.38	0.063	1.23	1.69	1.99	1.89	0.914	0.11	7.72	98.69	9	2	90	80	12	40	20	80	14	1.4
CATS-13-206		0.02	65.92	13.88	4.65	0.067	1.71	1.16	2.20	2.51	0.628	0.08	5.67	98.48	11	2	98	80	12	40	20	70	16	1.4
CATS-13-207		0.01	68.86	12.30	3.29	0.053	1.82	1.46	2.60	2.21	0.662	0.08	4.54	97.88	9	1	78	140	11	50	10	70	15	1.6
CATS-13-208		< 0.01	66.77	14.48	3.82	0.027	1.25	1.30	3.02	2.10	0.510	0.07	4.91	98.26	9	1	75	80	9	30	40	210	16	1.3
CATS-13-209		0.01	68.64	13.65	3.64	0.043	1.45	1.48	3.00	2.21	0.499	0.12	3.65	98.38	8	1	74	80	9	30	10	50	15	1.3
CATS-13-210		0.01	76.13	11.07	1.83	0.027	0.68	1.46	2.51	1.97	0.646	0.12	3.62	100.1	6	1	67	60	4	< 20	< 10	40	13	1.3
CATS-13-211		0.02	69.50	12.74	2.65	0.030	1.19	1.22	2.60	2.27	0.605	0.07	5.09	97.97	8	1	64	70	6	20	10	60	14	1.3
CATS-13-212		0.02	66.36	13.22	4.29	0.047	1.35	1.43	2.35	1.95	0.675	0.22	7.92	99.82	9	2	87	80	13	40	10	100	16	1.5
CATS-13-213		0.03	62.62	13.71	4.57	0.045	1.29	1.12	1.74	1.87	0.681	0.15	10.34	98.13	9	2	99	70	10	30	20	60	16	1.2
CATS-13-214		0.02	59.46	13.95	6.42	0.071	2.05	2.57	2.23	1.78	1.159	0.42	8.37	98.46	11	2	131	130	17	60	20	70	17	1.6
CATS-13-215		0.03	63.65	14.05	5.02	0.063	1.33	1.73	1.96	1.79	1.015	0.18	8.42	99.22	9	2	109	90	14	50	20	90	16	1.4
CATS-13-216		0.02	67.91	13.27	4.10	0.058	1.51	1.88	2.51	2.13	0.923	0.06	5.67	100.0	9	2	97	100	11	30	10	60	16	1.6
CATS-13-217		0.01	65.78	13.28	6.31	0.073	2.04	1.59	2.18	2.08	0.613	0.08	5.22	99.24	12	1	106	100	15	60	30	60	16	1.7
CATS-13-218		0.02	68.17	12.49	4.64	0.058	1.44	1.63	2.07	2.08	0.774	0.15	5.95	99.46	10	1	91	90	12	40	20	80	15	1.6
CATS-13-219		0.02	63.92	11.87	6.80	0.096	1.97	2.13	1.93	1.48	0.756	0.16	7.25	98.35	13	1	113	100	17	60	30	70	13	1.5
CATS-13-220		0.02	69.60	12.36	4.49	0.069	1.31	1.74	2.11	1.88	0.863	0.08	5.52	100.0	9	2	100	80	13	40	20	80	13	1.5
CATS-13-221		0.02	65.55	12.69	6.13	0.062	1.82	1.72	2.21	1.79	0.756	0.15	5.67	98.55	11	1	103	100	14	50	30	60	14	1.4
CATS-13-222		0.04	64.44	12.58	5.44	0.068	1.43	1.94	1.98	1.74	0.896	0.09	7.57	98.19	10	1	113	100	14	40	20	70	15	1.7
CATS-13-223		0.01	71.91	12.60	3.08	0.047	1.26	1.43	2.46	2.09	0.719	0.03	4.59	100.2	8	2	78	70	9	30	20	90	15	1.4
CATS-13-224		< 0.01	69.23	13.56	4.02	0.048	1.74	1.95	2.97	2.08	0.601	0.12	3.93	100.2	10	1	82	80	10	40	20	50	14	1.4
CATS-13-225		0.01	69.07	13.80	4.23	0.058	1.48	1.90	2.73	2.57	0.652	0.10	3.34	99.93	9	2	86	80	11	30	20	40	15	1.2
CATS-13-226		0.05	61.02	13.30	5.92	0.071	2.24	2.39	2.06	1.60	1.034	0.19	9.79	99.59	10	1	119	180	17	80	10	70	19	1.6
CATS-13-227		0.02	62.34	14.24	6.12	0.078	1.86	2.23	2.44	1.97	0.978	0.14	6.23	98.61	10	2	130	120	15	50	20	60	16	1.2
CATS-13-228		0.01	65.36	14.38	5.34	0.066	1.96	2.59	2.92	1.77	0.796	0.14	4.78	100.1	10	2	115	130	18	60	30	60	17	1.5
CATS-13-229		0.03	63.04	13.86	5.68	0.069	1.95	2.12	2.13	1.66	0.930	0.10	9.15	100.7	10	2	119	120	18	60	20	60	16	1.4
CATS-13-230		0.02	61.58	15.12	5.83	0.097	2.49	2.63	2.79	2.02	0.698	0.21	6.17	99.64	12	2	113	130	20	60	50	70	17	1.2
CATS-13-231		0.04	58.27	15.69	6.48	0.110	1.51	1.89	1.86	1.50	0.893	0.24	10.82	99.24	9	2	131	110	21	80	30	90	19	1.7
CATS-13-232		0.03	59.31	14.59	6.33	0.130	2.07	2.18	2.38	1.64	0.798	0.20	10.86	100.5	11	2	124	130	22	70	40	100	19	1.6
CATS-13-233		0.03	60.59	15.74	5.89	0.081	1.83	3.06	2.25	1.21	0.787	0.33	8.42	100.2	12	2	124	90	15	40	30	150	19	1.4
CATS-13-234		0.02	63.59	14.04	5.40	0.096	1.49	1.96	2.06	1.87	1.004	0.20	6.71	98.42	9	2	113	90	16	50	10	120	16	1.4
CATS-13-201-NM HMC																								
CATS-13-202-NM HMC		10.7																						
CATS-13-203-NM HMC		6.11																						
CATS-13-204-NM HMC		2.41																						
CATS-13-205-NM HMC		3.70																						
CATS-13-206-NM HMC		3.36																						
CATS-13-207-NM HMC		3.64																						
CATS-13-208-NM HMC		2.34																						
CATS-13-209-NM HMC		4.98																						
CATS-13-210-NM HMC		5.47																						
CATS-13-211-NM HMC																								
CATS-13-212-NM HMC																								
CATS-13-213-NM HMC																								
CATS-13-214-NM HMC		9.25																						
CATS-13-215-NM HMC		2.38																						
CATS-13-216-NM HMC		6.44																						
CATS-13-217-NM HMC		12.9																						
CATS-13-218-NM HMC		4.22																						

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Analyte Symbol	Mass	Total S	SiO2	Al2O3	Fe2O3(T)	MnO	MgO	CaO	Na2O	K2O	TiO2	P2O5	LOI	Total	Sc	Be	V	Cr	Co	Ni	Cu	Zn	Ga	Ge
Unit Symbol	g	%	%	%	%	%	%	%	%	%	%	%	%	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Detection Limit		0.01	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
Analysis Method	INAA	IR	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
CATS-13-219-NM HMC	10.8																							
CATS-13-220-NM HMC	5.61																							
CATS-13-221-NM HMC	12.7																							
CATS-13-222-NM HMC	4.44																							
CATS-13-223-NM HMC	3.52																							
CATS-13-224-NM HMC																								
CATS-13-225-NM HMC																								
CATS-13-226-NM HMC	13.8																							
CATS-13-227-NM HMC																								
CATS-13-228-NM HMC																								
CATS-13-229-NM HMC																								
CATS-13-230-NM HMC																								
CATS-13-231-NM HMC																								
CATS-13-232-NM HMC																								
CATS-13-233-NM HMC																								
CATS-13-234-NM HMC																								
CATS-13-201-MHMC																								
CATS-13-202-MHMC	8.28																							
CATS-13-203-MHMC	5.00																							
CATS-13-204-MHMC																								
CATS-13-205-MHMC																								
CATS-13-206-MHMC	2.13																							
CATS-13-207-MHMC																								
CATS-13-208-MHMC																								
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CATS-13-216-MHMC																								
CATS-13-217-MHMC	7.78																							
CATS-13-218-MHMC																								
CATS-13-219-MHMC	4.93																							
CATS-13-220-MHMC																								
CATS-13-221-MHMC	10.2																							
CATS-13-222-MHMC	3.95																							
CATS-13-223-MHMC																								
CATS-13-224-MHMC																								
CATS-13-225-MHMC	12.9																							
CATS-13-226-MHMC																								
CATS-13-227-MHMC																								
CATS-13-228-MHMC	13.9																							
CATS-13-229-MHMC																								
CATS-13-230-MHMC	10.4																							
CATS-13-231-MHMC																								
CATS-13-232-MHMC																								
CATS-13-233-MHMC																								
CATS-13-234-MHMC																								

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Analyte Symbol	As	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	ppm
Detection Limit	5	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
Analysis Method	FUS-MS	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
CATS-13-201	6	65	213	13.0	161	3.1	<2	1.0	<0.1	1	<0.2	2.5	463	26.1	60.5	6.03	22.3	3.92	0.907	3.22	0.44	2.46	0.49	1.36
CATS-13-202	< 5	77	198	13.9	241	9.6	<2	2.3	<0.1	1	<0.2	2.7	549	21.4	43.6	4.96	18.2	3.25	0.742	2.54	0.41	2.26	0.47	1.49
CATS-13-203	< 5	61	239	12.3	202	7.6	<2	1.7	<0.1	1	<0.2	2.3	494	18.6	42.2	4.36	16.6	3.14	0.750	2.41	0.40	2.07	0.42	1.23
CATS-13-204	< 5	65	199	13.9	268	9.4	<2	2.3	<0.1	1	<0.2	3.0	602	18.7	37.6	4.38	16.3	3.06	0.665	2.36	0.40	2.21	0.46	1.41
CATS-13-205	< 5	66	224	14.8	267	10.9	<2	1.5	<0.1	1	0.2	2.9	594	20.0	41.1	4.76	18.1	3.43	0.743	2.60	0.45	2.68	0.52	1.58
CATS-13-206	< 5	89	216	11.7	185	7.8	<2	0.9	<0.1	1	<0.2	3.0	633	20.8	44.8	4.86	17.9	3.21	0.753	2.38	0.38	2.33	0.45	1.25
CATS-13-207	13	96	247	12.1	204	3.8	<2	1.5	<0.1	<1	<0.2	4.1	588	22.9	45.2	5.35	20.0	3.45	0.745	2.89	0.40	2.33	0.45	1.28
CATS-13-208	< 5	64	283	9.7	150	4.7	<2	0.7	<0.1	1	0.6	2.8	542	26.4	47.3	5.85	21.2	3.51	0.787	2.38	0.34	1.88	0.34	0.96
CATS-13-209	< 5	68	307	9.8	161	1.1	<2	1.1	<0.1	1	<0.2	1.9	569	22.3	44.7	5.10	19.6	3.41	0.781	2.78	0.36	1.80	0.36	1.02
CATS-13-210	< 5	67	272	14.0	239	9.3	<2	1.7	<0.1	<1	0.3	2.3	567	21.5	41.9	5.04	18.0	3.35	0.689	2.55	0.39	2.36	0.50	1.57
CATS-13-211	< 5	80	286	10.3	200	5.9	<2	1.0	<0.1	<1	<0.2	3.2	642	19.9	39.3	4.73	17.6	3.10	0.738	2.19	0.34	1.87	0.39	1.18
CATS-13-212	< 5	74	250	11.6	208	6.9	<2	1.7	<0.1	1	<0.2	2.8	573	21.2	41.0	4.97	18.1	3.18	0.725	2.39	0.37	2.06	0.42	1.29
CATS-13-213	< 5	71	203	11.2	204	8.5	<2	1.0	<0.1	1	<0.2	3.8	562	19.2	37.8	4.40	16.4	3.01	0.713	2.11	0.35	2.11	0.43	1.19
CATS-13-214	< 5	61	288	15.4	297	10.5	<2	1.4	<0.1	1	<0.2	3.8	557	21.8	49.4	5.31	20.3	3.97	0.966	3.09	0.49	2.89	0.57	1.67
CATS-13-215	< 5	65	235	13.9	270	10.6	<2	1.3	<0.1	1	<0.2	4.0	630	17.6	39.3	4.20	15.8	3.13	0.809	2.55	0.42	2.52	0.51	1.51
CATS-13-216	< 5	75	311	13.2	275	9.6	<2	2.1	<0.1	2	<0.2	3.1	644	21.4	42.5	5.04	18.2	3.36	0.821	2.57	0.39	2.27	0.46	1.37
CATS-13-217	5	75	212	10.8	146	2.9	<2	0.9	<0.1	1	<0.2	2.6	512	18.3	39.4	4.16	15.7	2.83	0.668	2.41	0.36	2.02	0.41	1.12
CATS-13-218	< 5	78	218	13.9	223	5.5	<2	1.4	<0.1	1	<0.2	2.8	567	20.6	40.6	4.69	17.7	3.24	0.714	2.70	0.41	2.44	0.49	1.46
CATS-13-219	5	52	197	12.1	180	6.5	<2	1.0	<0.1	<1	0.2	2.6	432	13.5	28.5	3.24	12.2	2.48	0.639	2.13	0.35	2.31	0.46	1.29
CATS-13-220	< 5	61	232	12.7	272	8.5	<2	2.1	<0.1	1	<0.2	2.4	558	17.7	36.3	4.05	14.7	2.89	0.638	2.23	0.37	2.19	0.46	1.42
CATS-13-221	< 5	59	217	11.8	178	6.2	<2	0.9	<0.1	<1	<0.2	2.3	465	16.1	35.3	4.00	15.4	2.80	0.722	2.36	0.38	2.17	0.44	1.29
CATS-13-222	< 5	59	219	13.9	240	6.0	<2	1.5	<0.1	1	<0.2	3.2	522	16.9	34.5	3.96	15.5	2.93	0.711	2.50	0.41	2.47	0.50	1.45
CATS-13-223	< 5	92	278	12.7	232	8.7	<2	1.9	<0.1	2	<0.2	3.6	587	22.8	43.9	5.13	19.1	3.15	0.735	2.46	0.39	2.23	0.44	1.32
CATS-13-224	< 5	66	298	11.3	167	5.4	<2	0.8	<0.1	<1	<0.2	2.1	544	18.8	40.8	4.87	17.8	3.52	0.853	2.66	0.41	2.23	0.45	1.30
CATS-13-225	< 5	85	318	13.4	280	7.7	<2	1.2	<0.1	1	<0.2	3.4	648	31.0	70.2	7.00	25.0	4.40	0.987	3.21	0.45	2.52	0.50	1.44
CATS-13-226	< 5	67	263	13.4	260	7.1	<2	1.8	<0.1	1	<0.2	3.3	583	18.2	35.5	4.29	16.6	3.33	0.809	2.67	0.40	2.38	0.48	1.41
CATS-13-227	< 5	72	283	12.3	240	9.0	<2	1.2	<0.1	1	<0.2	3.2	568	20.9	42.2	5.03	18.9	3.49	0.859	2.61	0.40	2.32	0.48	1.39
CATS-13-228	< 5	60	363	12.5	246	3.5	<2	1.5	<0.1	<1	<0.2	2.2	530	21.6	58.5	5.06	19.3	3.36	0.859	2.97	0.40	2.21	0.46	1.34
CATS-13-229	< 5	59	283	13.5	260	8.8	<2	1.2	<0.1	<1	<0.2	3.2	580	22.3	45.2	5.27	19.9	3.69	0.886	2.82	0.45	2.59	0.54	1.54
CATS-13-230	< 5	70	339	13.7	182	5.6	<2	0.9	<0.1	<1	<0.2	3.5	576	34.0	73.3	8.37	30.4	5.18	1.27	3.70	0.52	2.83	0.53	1.46
CATS-13-231	< 5	61	230	13.2	205	7.8	<2	1.5	<0.1	1	<0.2	3.2	573	21.5	48.9	4.83	18.0	3.28	0.802	2.54	0.42	2.33	0.48	1.39
CATS-13-232	< 5	69	298	13.7	204	7.7	<2	1.6	<0.1	1	<0.2	3.1	557	31.1	64.1	7.16	26.0	4.47	1.10	3.25	0.47	2.51	0.51	1.43
CATS-13-233	< 5	55	353	14.0	220	8.2	<2	1.1	<0.1	1	<0.2	4.9	449	24.2	50.5	6.14	23.5	4.30	1.09	3.18	0.46	2.56	0.52	1.50
CATS-13-234	< 5	69	250	14.3	248	9.9	<2	1.3	<0.1	1	<0.2	4.2	685	17.9	40.7	4.29	16.6	3.15	0.851	2.50	0.43	2.66	0.55	1.57

CATS-13-201-NM HMC
 CATS-13-202-NM HMC
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 CATS-13-215-NM HMC
 CATS-13-216-NM HMC
 CATS-13-217-NM HMC
 CATS-13-218-NM HMC

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Analyte Symbol	As	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	ppm
Detection Limit	5	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
Analysis Method	FUS-MS	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

- CATS-13-219-NM HMC
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- CATS-13-233-MHMC
- CATS-13-234-MHMC

Analyte Symbol	Tm	Yb	Lu	Hf	Ta	W	Ti	Pb	Bi	Th	U
Unit Symbol	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Detection Limit	0.005	0.01	0.002	0.1	0.01	0.5	0.05	5	0.1	0.05	0.01
Analysis Method	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS
CATS-13-201	0.206	1.36	0.202	3.7	0.46	4.9	0.38	10	< 0.1	7.57	1.80
CATS-13-202	0.235	1.55	0.226	5.2	0.81	< 0.5	0.39	11	< 0.1	5.69	1.80
CATS-13-203	0.187	1.22	0.188	4.2	19.2	3.3	0.35	9	< 0.1	5.04	1.38
CATS-13-204	0.216	1.43	0.240	5.4	0.82	0.8	0.40	10	< 0.1	5.20	1.75
CATS-13-205	0.262	1.75	0.262	6.2	1.06	0.5	0.35	9	< 0.1	5.95	1.88
CATS-13-206	0.196	1.37	0.202	4.1	0.85	< 0.5	0.50	12	< 0.1	6.29	1.61
CATS-13-207	0.200	1.31	0.194	4.5	0.73	< 0.5	0.46	13	< 0.1	5.21	1.52
CATS-13-208	0.149	0.94	0.131	3.6	0.56	< 0.5	0.43	13	< 0.1	5.29	1.57
CATS-13-209	0.168	1.06	0.145	3.9	0.42	< 0.5	0.39	11	< 0.1	5.11	1.16
CATS-13-210	0.252	1.64	0.242	6.1	0.67	1.4	0.34	10	< 0.1	5.71	1.75
CATS-13-211	0.196	1.25	0.185	4.8	0.73	0.7	0.43	11	< 0.1	4.88	1.53
CATS-13-212	0.188	1.20	0.182	4.8	0.67	3.1	0.40	11	< 0.1	5.59	1.57
CATS-13-213	0.205	1.33	0.201	4.8	0.86	0.5	0.40	12	< 0.1	6.07	1.80
CATS-13-214	0.246	1.68	0.268	7.1	1.05	< 0.5	0.32	12	< 0.1	6.57	2.03
CATS-13-215	0.237	1.60	0.252	6.3	1.01	< 0.5	0.34	12	< 0.1	5.32	2.19
CATS-13-216	0.215	1.38	0.223	5.9	0.89	0.6	0.40	13	< 0.1	6.99	1.69
CATS-13-217	0.171	1.23	0.174	3.4	0.45	< 0.5	0.41	9	< 0.1	5.15	1.28
CATS-13-218	0.239	1.52	0.247	5.2	0.66	< 0.5	0.42	10	< 0.1	5.00	1.66
CATS-13-219	0.210	1.42	0.216	4.3	0.67	< 0.5	0.29	9	< 0.1	3.70	1.20
CATS-13-220	0.217	1.41	0.209	5.4	0.72	1.0	0.38	9	< 0.1	4.71	1.49
CATS-13-221	0.190	1.27	0.181	4.2	0.76	6.1	0.33	8	< 0.1	4.47	1.17
CATS-13-222	0.244	1.60	0.241	5.5	0.66	< 0.5	0.36	10	< 0.1	4.14	1.54
CATS-13-223	0.192	1.36	0.203	5.0	12.1	2.0	0.45	12	< 0.1	5.08	1.74
CATS-13-224	0.195	1.31	0.183	4.1	0.63	17.5	0.34	9	< 0.1	4.71	1.27
CATS-13-225	0.228	1.46	0.217	6.7	0.85	< 0.5	0.54	15	0.2	9.36	2.22
CATS-13-226	0.235	1.53	0.228	5.9	0.72	< 0.5	0.32	9	< 0.1	4.48	1.78
CATS-13-227	0.220	1.35	0.208	5.6	0.94	1.7	0.40	12	< 0.1	6.01	1.60
CATS-13-228	0.203	1.32	0.192	5.4	0.46	3.5	0.32	10	< 0.1	5.13	1.37
CATS-13-229	0.240	1.62	0.230	5.8	0.93	< 0.5	0.34	10	< 0.1	5.33	1.94
CATS-13-230	0.210	1.43	0.200	4.2	0.88	< 0.5	0.39	13	< 0.1	7.24	1.69
CATS-13-231	0.204	1.39	0.212	4.2	0.69	< 0.5	0.34	12	< 0.1	5.38	1.69
CATS-13-232	0.208	1.42	0.202	4.6	0.64	1.4	0.36	15	< 0.1	6.80	1.74
CATS-13-233	0.250	1.67	0.258	5.4	0.86	< 0.5	0.30	13	< 0.1	6.05	1.96
CATS-13-234	0.244	1.61	0.252	6.0	7.50	< 0.5	0.35	13	< 0.1	5.76	1.84
CATS-13-201-NM HMC											
CATS-13-202-NM HMC											
CATS-13-203-NM HMC											
CATS-13-204-NM HMC											
CATS-13-205-NM HMC											
CATS-13-206-NM HMC											
CATS-13-207-NM HMC											
CATS-13-208-NM HMC											
CATS-13-209-NM HMC											
CATS-13-210-NM HMC											
CATS-13-211-NM HMC											
CATS-13-212-NM HMC											
CATS-13-213-NM HMC											
CATS-13-214-NM HMC											
CATS-13-215-NM HMC											
CATS-13-216-NM HMC											
CATS-13-217-NM HMC											
CATS-13-218-NM HMC											

Analyte Symbol	Tm	Yb	Lu	Hf	Ta	W	Ti	Pb	Bi	Th	U
Unit Symbol	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Detection Limit	0.005	0.01	0.002	0.1	0.01	0.5	0.05	5	0.1	0.05	0.01
Analysis Method	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS

- CATS-13-219-NM HMC
- CATS-13-220-NM HMC
- CATS-13-221-NM HMC
- CATS-13-222-NM HMC
- CATS-13-223-NM HMC
- CATS-13-224-NM HMC
- CATS-13-225-NM HMC
- CATS-13-226-NM HMC
- CATS-13-227-NM HMC
- CATS-13-228-NM HMC
- CATS-13-229-NM HMC
- CATS-13-230-NM HMC
- CATS-13-231-NM HMC
- CATS-13-232-NM HMC
- CATS-13-233-NM HMC
- CATS-13-234-NM HMC
- CATS-13-201-MHMC
- CATS-13-202-MHMC
- CATS-13-203-MHMC
- CATS-13-204-MHMC
- CATS-13-205-MHMC
- CATS-13-206-MHMC
- CATS-13-207-MHMC
- CATS-13-208-MHMC
- CATS-13-209-MHMC
- CATS-13-210-MHMC
- CATS-13-211-MHMC
- CATS-13-212-MHMC
- CATS-13-213-MHMC
- CATS-13-214-MHMC
- CATS-13-215-MHMC
- CATS-13-216-MHMC
- CATS-13-217-MHMC
- CATS-13-218-MHMC
- CATS-13-219-MHMC
- CATS-13-220-MHMC
- CATS-13-221-MHMC
- CATS-13-222-MHMC
- CATS-13-223-MHMC
- CATS-13-224-MHMC
- CATS-13-225-MHMC
- CATS-13-226-MHMC
- CATS-13-227-MHMC
- CATS-13-228-MHMC
- CATS-13-229-MHMC
- CATS-13-230-MHMC
- CATS-13-231-MHMC
- CATS-13-232-MHMC
- CATS-13-233-MHMC
- CATS-13-234-MHMC

Quality Control

Analyte Symbol	Pd	Pt	Au	Au	Ag	As	Ba	Br	Ca	Co	Cr	Cs	Fe	Hf	Hg	Ir	Mo	Na	Ni	Rb	Sb	Sc	Se	Sr
Unit Symbol	ppb	ppb	ppb	ppb	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	%	ppm	ppm	ppb	ppm	%	ppm	ppm	ppm	ppm	ppm	%
Detection Limit	1	1	2	5	5	2	200	5	1	5	10	2	0.02	1	5	50	20	0.05	200	50	0.2	0.1	20	0.2
Analysis Method	FA-MS	FA-MS	FA-MS	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA

NIST 694 Meas
 NIST 694 Cert
 DNC-1 Meas
 DNC-1 Cert
 GBW 07113 Meas
 GBW 07113 Cert
 LKSD-3 Meas
 LKSD-3 Cert
 LKSD-4 Meas
 LKSD-4 Cert
 LKSD-4 Meas
 LKSD-4 Cert
 BaSO4 Meas
 BaSO4 Cert
 BaSO4 Meas
 BaSO4 Cert
 W-2a Meas
 W-2a Cert
 SY-4 Meas
 SY-4 Cert
 CTA-AC-1 Meas
 CTA-AC-1 Cert
 BIR-1a Meas
 BIR-1a Cert
 NCS DC86312 Meas
 NCS DC86312 Cert
 NCS DC70014 Meas
 NCS DC70014 Cert
 NCS DC70009
 (GBW07241) Meas
 NCS DC70009
 (GBW07241) Cert
 OREAS 100a (Fusion)
 Meas
 OREAS 100a (Fusion)
 Cert
 OREAS 101a (Fusion)
 Meas
 OREAS 101a (Fusion)
 Cert
 JR-1 Meas
 JR-1 Cert
 GS311-4 Meas
 GS311-4 Cert
 GS311-4 Meas
 GS311-4 Cert
 GS900-5 Meas
 GS900-5 Cert
 CDN-PGMS-24 Meas
 CDN-PGMS-24 Cert
 CDN-PGMS-25 Meas
 CDN-PGMS-25 Cert
 DMMAS 116 Meas
 DMMAS 116 Cert
 DMMAS 116 Meas
 DMMAS 116 Cert
 DMMAS 116 Meas
 DMMAS 116 Cert
 DMMAS 116 Meas
 DMMAS 116 Cert

4870 1090 856
 4880.00 1090.00 806.000
 1810 400 446
 1830 400 483
 1650 1530 < 200
 1610 1560 1190
 1620 1590 1400
 1610 1560 1190
 1790 1580 1100
 1610 1560 1190
 1560 1550 1400

< 200
 42 70
 41.0 77.0
 43 70
 41.0 77.0
 40 80
 41.0 77.0
 43 60

3.20
 3.12
 3.17
 3.12
 3.10
 3.12
 3.33

2.07
 1.98
 2.06
 1.98
 2.03
 1.98
 2.08

7.0
 6.80
 7.2
 6.80
 6.3
 6.80
 6.7

6.6
 6.30
 6.3
 6.30
 6.3
 6.30
 6.2

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Quality Control																									
Analyte Symbol	Pd	Pt	Au	Au	Ag	As	Ba	Br	Ca	Co	Cr	Cs	Fe	Hf	Hg	Ir	Mo	Na	Ni	Rb	Sb	Sc	Se	Sr	
Unit Symbol	ppb	ppb	ppb	ppb	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	%	ppm	ppm	ppb	ppm	%	ppm	ppm	ppm	ppm	ppm	%	
Detection Limit	1	1	2	5	5	2	200	5	1	5	10	2	0.02	1	5	50	20	0.05	200	50	0.2	0.1	20	0.2	
Analysis Method	FA-MS	FA-MS	FA-MS	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	
DMMAS 116 Cert				1610		1560	1190			41.0	77.0		3.12					1.98			6.80	6.30			
CATS-13-203 Orig	< 1	< 1	3																						
CATS-13-203 Dup	2	< 1	< 2																						
CATS-13-210 Orig																									
CATS-13-210 Dup																									
CATS-13-220 Orig	< 1	< 1	9																						
CATS-13-220 Dup	< 1	< 1	9																						
CATS-13-230 Orig																									
CATS-13-230 Dup																									
CATS-13-232 Orig																									
CATS-13-232 Dup																									
CATS-13-233 Orig	< 1	< 1	< 2																						
CATS-13-233 Dup	< 1	< 1	< 2																						
Method Blank	< 1	< 1	< 2																						
Method Blank	< 1	< 1	< 2																						
Method Blank				< 5	< 5	< 2	< 200	< 5	< 1	< 5	< 10	< 2	< 0.02	< 1	< 5	< 50	< 20	< 0.05	< 200	< 50	< 0.2	< 0.1	< 20	< 0.2	
Method Blank				< 5	< 5	< 2	< 200	< 5	< 1	< 5	< 10	< 2	< 0.02	< 1	< 5	< 50	< 20	< 0.05	< 200	< 50	< 0.2	< 0.1	< 20	< 0.2	
Method Blank				< 5	< 5	< 2	< 200	< 5	< 1	< 5	< 10	< 2	< 0.02	< 1	< 5	< 50	< 20	< 0.05	< 200	< 50	< 0.2	< 0.1	< 20	< 0.2	

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Quality Control																								
Analyte Symbol	Ta	Th	U	W	Zn	La	Ce	Nd	Sm	Eu	Tb	Yb	Lu	Mass	Total S	SiO2	Al2O3	Fe2O3(T)	MnO	MgO	CaO	Na2O	K2O	TiO2
Unit Symbol	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	g	%	%	%	%	%	%	%	%	%	%
Detection Limit	1	0.5	0.5	4	200	1	3	10	0.1	0.2	2	0.2	0.05		0.01	0.01	0.01	0.01	0.001	0.01	0.01	0.01	0.01	0.001
Analysis Method	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	IR	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP
NIST 694 Meas																11.11	1.91	0.75	0.013	0.34	42.88	0.86	0.54	0.116
NIST 694 Cert																11.2	1.80	0.790	0.0116	0.330	43.6	0.860	0.510	0.110
DNC-1 Meas																46.79	18.16	9.61	0.146	10.06	11.41	1.90	0.22	0.484
DNC-1 Cert																47.15	18.34	9.97	0.150	10.13	11.49	1.890	0.234	0.480
GBW 07113 Meas																72.19	12.97	3.23	0.144	0.15	0.61	2.47	5.41	0.283
GBW 07113 Cert																72.8	13.0	3.21	0.140	0.160	0.590	2.57	5.43	0.300
LKSD-3 Meas																								
LKSD-3 Cert																								
LKSD-4 Meas															0.91									
LKSD-4 Cert															0.990									
LKSD-4 Meas															0.95									
LKSD-4 Cert															0.990									
BaSO4 Meas															14.0									
BaSO4 Cert															14.0									
BaSO4 Meas															13.8									
BaSO4 Cert															14.0									
W-2a Meas																52.51	15.57	10.89	0.167	6.33	11.08	2.21	0.62	1.076
W-2a Cert																52.4	15.4	10.7	0.163	6.37	10.9	2.14	0.626	1.06
SY-4 Meas																49.63	20.78	6.20	0.106	0.51	8.09	6.96	1.66	0.290
SY-4 Cert																49.9	20.69	6.21	0.108	0.54	8.05	7.10	1.66	0.287
CTA-AC-1 Meas																								
CTA-AC-1 Cert																								
BIR-1a Meas																48.03	15.84	11.13	0.172	9.61	13.52	1.81	0.02	0.974
BIR-1a Cert																47.96	15.50	11.30	0.175	9.700	13.30	1.82	0.030	0.96
NCS DC86312 Meas																								
NCS DC86312 Cert																								
NCS DC70014 Meas																								
NCS DC70014 Cert																								
NCS DC70009 (GBW07241) Meas																								
NCS DC70009 (GBW07241) Cert																								
OREAS 100a (Fusion) Meas																								
OREAS 100a (Fusion) Cert																								
OREAS 101a (Fusion) Meas																								
OREAS 101a (Fusion) Cert																								
JR-1 Meas																								
JR-1 Cert																								
GS311-4 Meas															0.53									
GS311-4 Cert															0.54									
GS311-4 Meas															0.55									
GS311-4 Cert															0.54									
GS900-5 Meas															0.34									
GS900-5 Cert															0.34									
CDN-PGMS-24 Meas																								
CDN-PGMS-24 Cert																								
CDN-PGMS-25 Meas																								
CDN-PGMS-25 Cert																								
DMMAS 116 Meas			11.9			16	30		2.5															
DMMAS 116 Cert			11.2			15.9	30.0		2.40															
DMMAS 116 Meas			11.5			16	33		2.5															
DMMAS 116 Cert			11.2			15.9	30.0		2.40															
DMMAS 116 Meas			10.5			16	28		2.5															
DMMAS 116 Cert			11.2			15.9	30.0		2.40															
DMMAS 116 Meas			10.2			16	29		2.6															

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Quality Control																								
Analyte Symbol	Ta	Th	U	W	Zn	La	Ce	Nd	Sm	Eu	Tb	Yb	Lu	Mass	Total S	SiO2	Al2O3	Fe2O3(T)	MnO	MgO	CaO	Na2O	K2O	TiO2
Unit Symbol	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	g	%	%	%	%	%	%	%	%	%	%
Detection Limit	1	0.5	0.5	4	200	1	3	10	0.1	0.2	2	0.2	0.05		0.01	0.01	0.01	0.01	0.001	0.01	0.01	0.01	0.01	0.001
Analysis Method	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	IR	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP
DMMAS 116 Cert			11.2			15.9	30.0		2.40															
CATS-13-203 Orig																								
CATS-13-203 Dup																								
CATS-13-210 Orig															0.01									
CATS-13-210 Dup															0.01									
CATS-13-220 Orig															0.02									
CATS-13-220 Dup															0.01									
CATS-13-230 Orig															0.03									
CATS-13-230 Dup															0.01									
CATS-13-232 Orig																59.16	14.46	6.29	0.129	2.07	2.17	2.38	1.63	0.787
CATS-13-232 Dup																59.45	14.72	6.38	0.131	2.08	2.18	2.38	1.64	0.809
CATS-13-233 Orig																								
CATS-13-233 Dup																								
Method Blank																								
Method Blank																								
Method Blank																								
Method Blank	< 1	< 0.5	< 0.5	< 4	< 200	< 1	< 3	< 10	< 0.1	< 0.2	< 2	< 0.2	< 0.05	30.0										
Method Blank	< 1	< 0.5	< 0.5	< 4	< 200	< 1	< 3	< 10	< 0.1	< 0.2	< 2	< 0.2	< 0.05	10.0										
Method Blank	< 1	< 0.5	< 0.5	< 4	< 200	< 1	< 3	< 10	< 0.1	< 0.2	< 2	< 0.2	< 0.05	1.00										

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Quality Control																									
Analyte Symbol	P2O5	LOI	Total	Sc	Be	V	Cr	Co	Ni	Cu	Zn	Ga	Ge	As	Rb	Sr	Y	Zr	Nb	Mo	Ag	In	Sn	Sb	
Unit Symbol	%	%	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	
Detection Limit	0.01		0.01	1	1	5	20	1	20	10	30	1	0.5	5	1	2	0.5	1	0.2	2	0.5	0.1	1	0.2	
Analysis Method	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	FUS-MS	FUS-ICP	FUS-MS	FUS-ICP	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	
NIST 694 Meas	30.12					1651																			
NIST 694 Cert	30.2					1740																			
DNC-1 Meas	0.11			31		159	270	58	260	100	70					141	16.2	34							
DNC-1 Cert	0.070			31		148	270	57	247	100	70					144.0	18.0	38							
GBW 07113 Meas	0.04			5	4	9										40		412							
GBW 07113 Cert	0.0500			5.00	4.00	5.00										43.0		403							
LKSD-3 Meas								30	40	30					71					< 2	2.2				
LKSD-3 Cert								30.0	47.0	35.0					78.0					2.00	2.70				
LKSD-4 Meas																									
LKSD-4 Cert																									
LKSD-4 Meas																									
LKSD-4 Cert																									
BaSO4 Meas																									
BaSO4 Cert																									
BaSO4 Meas																									
BaSO4 Cert																									
W-2a Meas	0.16			35	< 1	281		43	70	100		17	1.8			195		88	7.3	< 2	< 0.5				
W-2a Cert	0.130			36.0	1.30	262		43.0	70.0	110		17.0	1.00			190		94.0	7.90	0.600	0.0460				
SY-4 Meas	0.14			1	3	9										1212		515							
SY-4 Cert	0.131			1.1	2.6	8.0										1191		517							
CTA-AC-1 Meas										50															
CTA-AC-1 Cert										54.0															
BIR-1a Meas	0.03			44	< 1	345	370	54	170		70	16				107	15.8	15	0.6					0.6	
BIR-1a Cert	0.021			44	0.58	310	370	52	170		70	16				110	16	18	0.6					0.58	
NCS DC86312 Meas																									
NCS DC86312 Cert																									
NCS DC70014 Meas								25	70	2610	7400	25						30.7		> 100	16.7			180	
NCS DC70014 Cert								26	70	2600	7400	25.2						32.1		270	16.7			180	
NCS DC70009 (GBW07241) Meas								3		940		16	11.1	71	503			134				1.3	> 1000		
NCS DC70009 (GBW07241) Cert								3.7		960		16.5	11.2	69.9	500			128				1.3	1701		
OREAS 100a (Fusion) Meas								17		160								128		22					
OREAS 100a (Fusion) Cert								18.1		169								142		24.1					
OREAS 101a (Fusion) Meas								47		420								168							
OREAS 101a (Fusion) Cert								48.8		434								183							
JR-1 Meas									< 20	< 10	30	17		18	250				14.6	3	< 0.5	< 0.1			
JR-1 Cert									1.67	2.68	30.6	16.1		16.3	257				15.2	3.25	0.031	0.028			
GS311-4 Meas																									
GS311-4 Cert																									
GS311-4 Meas																									
GS311-4 Cert																									
GS900-5 Meas																									
GS900-5 Cert																									
CDN-PGMS-24 Meas																									
CDN-PGMS-24 Cert																									
CDN-PGMS-25 Meas																									
CDN-PGMS-25 Cert																									
DMMAS 116 Meas																									
DMMAS 116 Cert																									
DMMAS 116 Meas																									
DMMAS 116 Cert																									
DMMAS 116 Meas																									
DMMAS 116 Cert																									
DMMAS 116 Meas																									

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Quality Control																									
Analyte Symbol	P2O5	LOI	Total	Sc	Be	V	Cr	Co	Ni	Cu	Zn	Ga	Ge	As	Rb	Sr	Y	Zr	Nb	Mo	Ag	In	Sn	Sb	
Unit Symbol	%	%	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	
Detection Limit	0.01		0.01	1	1	5	20	1	20	10	30	1	0.5	5	1	2	0.5	1	0.2	2	0.5	0.1	1	0.2	
Analysis Method	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	FUS-MS	FUS-ICP	FUS-MS	FUS-ICP	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	

DMMAS 116 Cert																								
CATS-13-203 Orig																								
CATS-13-203 Dup																								
CATS-13-210 Orig																								
CATS-13-210 Dup																								
CATS-13-220 Orig																								
CATS-13-220 Dup																								
CATS-13-230 Orig																								
CATS-13-230 Dup																								
CATS-13-232 Orig	0.19	10.86	100.1	11	2	123	120	22	70	40	110	18	1.6	< 5	68	296	13.5	197	7.7	< 2	1.5	< 0.1	1	< 0.2
CATS-13-232 Dup	0.20	10.86	100.8	11	2	125	130	22	70	40	90	19	1.7	6	70	300	13.9	211	7.6	< 2	1.7	< 0.1	1	< 0.2
CATS-13-233 Orig																								
CATS-13-233 Dup																								
Method Blank																								
Method Blank																								
Method Blank							< 20	< 1	< 20	< 10	< 30	< 1	< 0.5	< 5	< 1		< 0.5		< 0.2	< 2	< 0.5	< 0.1	< 1	< 0.2
Method Blank																								
Method Blank																								
Method Blank																								

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Quality Control																									
Analyte Symbol	Cs	Ba	La	Ce	Pr	Nd	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu	Hf	Ta	W	Tl	Pb	Bi	Th	U	
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	ppm	
Detection Limit	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	0.005	0.01	0.002	0.1	0.01	0.5	0.05	5	0.1	0.05	0.01	
Analysis Method	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	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		105	3.53			4.72		0.575							1.99										
DNC-1 Cert		118	3.6			5.20		0.59							2.0										
GBW 07113 Meas		499																							
GBW 07113 Cert		506																							
LKSD-3 Meas	2.3			85.6		41.8	7.75	1.38			4.75				2.69	0.391		0.67					10.8	4.31	
LKSD-3 Cert	2.30			90.0		44.0	8.00	1.50			4.90				2.70	0.400		0.700					11.4	4.60	
LKSD-4 Meas																									
LKSD-4 Cert																									
LKSD-4 Meas																									
LKSD-4 Cert																									
BaSO4 Meas																									
BaSO4 Cert																									
BaSO4 Meas																									
BaSO4 Cert																									
W-2a Meas		174	10.4	22.3		12.6	3.27	1.08		0.63	3.79	0.78			2.06	0.302		0.51	< 0.5	0.08		< 0.1		0.52	
W-2a Cert		182	10.0	23.0		13.0	3.30	1.00		0.630	3.60	0.760			2.10	0.330		0.500	0.300	0.200		0.0300		0.530	
SY-4 Meas		344																							
SY-4 Cert		340																							
CTA-AC-1 Meas			> 2000	> 3000		1140	169	45.7	124	15.2					11.1	1.13		2.53					23.1	4.20	
CTA-AC-1 Cert			2176	3326		1087	162	46.7	124	13.9					11.4	1.08		2.65					21.8	4.4	
BIR-1a Meas		8						0.602	2.08						1.76	0.276					< 5				
BIR-1a Cert		6						0.55	2.0						1.7	0.3					3				
NCS DC86312 Meas			> 2000	170		1560			227	34.1	183	35.6	96.3	14.3	87.3	12.0								25.6	
NCS DC86312 Cert			2360	190		1600			225.0	34.6	183	36	96.2	15.1	87.79	11.96								23.6	
NCS DC70014 Meas			41.9	81.2		36.5	7.58		6.81	1.12	6.25	1.24	3.38	0.527	3.31	0.468					> 10000	80.3			
NCS DC70014 Cert			45.3	87.0		39.9	8.0		7.4	1.1	6.7	1.3	3.5	0.57	3.3	0.50					27200	80.3			
NCS DC70009 (GBW07241) Meas	43.8		22.4	55.8	7.52	31.1	12.5		14.3	3.23	20.9	4.33	12.8	2.36	16.1	2.27			2200					28.7	
NCS DC70009 (GBW07241) Cert	41		23.7	60.3	7.9	32.9	12.5		14.8	3.3	20.7	4.5	13.4	2.2	14.9	2.4			2200					28.3	
OREAS 100a (Fusion) Meas			250	445	44.7	145	23.8	3.55		3.62	22.5	4.82	14.2	2.31	15.0	2.11								51.7	135
OREAS 100a (Fusion) Cert			260	463	47.1	152	23.6	3.71		3.80	23.2	4.81	14.9	2.31	14.9	2.26								51.6	135
OREAS 101a (Fusion) Meas			782	1360	127	386	49.9	7.90		5.53	31.7	6.52	18.6	2.92	18.1	2.50								36.4	422
OREAS 101a (Fusion) Cert			816	1396	134	403	48.8	8.06		5.92	33.3	6.46	19.5	2.90	17.5	2.66								36.6	422
JR-1 Meas	20.9		19.5	45.4	5.82	23.1	5.87	0.274	5.54	1.05			3.94	0.704	4.77	0.685	4.1			1.57	20	0.6	26.7	8.93	
JR-1 Cert	20.8		19.7	47.2	5.58	23.3	6.03	0.30	5.06	1.01			3.61	0.67	4.55	0.71	4.51			1.56	19.3	0.56	26.7	8.88	
GS311-4 Meas																									
GS311-4 Cert																									
GS311-4 Meas																									
GS311-4 Cert																									
GS900-5 Meas																									
GS900-5 Cert																									
CDN-PGMS-24 Meas																									
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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	ppm	
Detection Limit	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	0.005	0.01	0.002	0.1	0.01	0.5	0.05	5	0.1	0.05	0.01	
Analysis Method	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	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	FUS-MS	

DMMAS 116 Cert																								
CATS-13-203 Orig																								
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CATS-13-220 Orig																								
CATS-13-220 Dup																								
CATS-13-230 Orig																								
CATS-13-230 Dup																								
CATS-13-232 Orig	3.1	555	31.0	63.8	7.07	25.6	4.45	1.06	3.27	0.46	2.48	0.49	1.37	0.198	1.42	0.192	4.5	0.58	0.8	0.32	14	< 0.1	6.67	1.68
CATS-13-232 Dup	3.1	559	31.2	64.4	7.25	26.4	4.50	1.14	3.23	0.48	2.54	0.52	1.49	0.218	1.42	0.212	4.7	0.70	2.0	0.40	15	< 0.1	6.93	1.80
CATS-13-233 Orig																								
CATS-13-233 Dup																								
Method Blank																								
Method Blank																								
Method Blank	< 0.1		< 0.05	< 0.05	< 0.01	< 0.05	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.002	< 0.1	< 0.01	< 0.5	< 0.05	< 5	< 0.1	< 0.05	< 0.01
Method Blank																								
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