

# IV. TRANSITION-METAL AND TRACE-ELEMENT ANALYSES OF LEG 49 SAMPLES<sup>1</sup>

All analyses are given in parts per million. The analyst responsible for each element has been distinguished according to the codes given at the beginning of Appendix I.

Sample (Interval in cm)	Analyst	Sc	Ti	V	Cr	Mn	Fe	Co		Ni		Rb		Sr	Y	Zr		Nb	Sb	Cs	Ba
		J	B	B	B	B	B	B	J	B	J	B	J	B	B	B	J	B	J	J	J
407-35-1, 42-44		43.7	23441	530	24	1471	114380	54	48.6	34	31	10.3	7.0	208	57.6	252	—	30.8	0.075	—	96
407-36-3, 60-62		—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
407-38-2, 148-150		—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
407-39-1, 55-59		40.6	17266	403	106	1704	101010	54	52	75	82	6.1	4.4	235	42.4	200	195	22.8	0.23	0.08	74
407-39-2, 62-64		—	17086	406	107	1626	106120	52	—	71	—	3.6	—	232	38.9	186	—	23.3	—	—	—
407-39-3, 45-47		41.2	17086	409	106	1548	103250	54	51.2	68	71	4.0	—	232	44	193	—	23	—	—	60
407-41-1, 16-20		40.3	16966	398	91	1626	108570	55	49.5	66	63	17.2	16.1	221	40	195	182	23	0.04	0.4	81
407-42-1, 82-89		39.6	17206	406	93	1704	103040	53	49	71	65	12.9	5.0	228	40.3	205	197	22.9	0.04	0.06	71
407-44-1, 17-19		—	12884	378	254	1239	104370	48	—	71	—	—	—	—	—	—	—	—	—	—	—
407-45-1, 69-71		—	13549	405	292	929	83020	55	—	110	—	—	—	—	—	—	—	—	—	—	—
407-45-2, 40-42		—	13129	372	275	1239	85400	83	—	140	—	—	—	—	—	—	—	—	—	—	—
407-45-3, 115-124		45.6	12769	383	313	929	76020	71	71.3	146	147	—	—	—	—	140	—	0.064	—	—	—
407-45-4, 53-55		—	12050	—	—	1007	82040	—	—	—	—	—	—	—	—	—	—	—	—	—	—
407-46-1, 63-65		41.1	11570	325	263	1626	88130	59	56.8	99	102	8.3	—	181	39.5	137	—	15.3	—	0.4	—
407-46-2, 59-61		—	11750	378	296	1007	88720	55	—	121	—	2.9	—	174	35.2	125	—	15.1	—	—	—
407-46-3, 66-68		—	11031	349	294	1626	91420	48	—	110	—	—	—	—	—	—	—	—	—	—	—
407-46-4, 3-5		—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
407-46-4, 68-72		42.0	12290	405	224	1471	100730	49	46.4	101	95	11.2	10.0	195	42	135	140	16.8	0.59	0.27	37
407-47-1, 48-59		43.3	11990	390	294	1667	76370	50	50.9	102	101	4.2	—	179	41.7	129	—	14.8	—	—	36
407-47-2, 10-12		40.0	11750	357	261	1471	98840	51	48.4	122	121	6.3	5.7	173	35.9	130	—	17.7	—	—	—
407-47-2, 86-88		39.3	11951	362	257	1704	93170	48	45.1	92	88	7.9	—	169	36.2	123	—	15.6	0.18	0.19	47
407-47-3, 19-21		42.3	11810	365	265	1007	81200	52	51.8	101	106	1.5	—	178	33.3	118	—	14.6	—	—	—
407-47-4, 39-41		40.7	11630	352	258	1548	88760	61	61.5	124	127	7.5	5.6	175	38.6	132	—	15.2	—	0.44	—
408-35-1, 108-110		—	9712	374	314	1239	91420	38	—	52	—	11.8	—	255	28	107	—	14.3	—	—	—
408-36-1, 100-103		36.9	9532	332	267	1549	87780	46	46.4	103	102	6.4	—	227	26.8	105	123	14.3	0.22	0.3	—
408-36-2, 12-14		40.0	9712	370	299	1471	94640	47	45.6	73	69	12.5	12	207	31.2	99	120	14.0	0.72	0.31	—
408-36-3, 46-49		39.1	9792	323	294	1084	80430	51	49.5	117	115	6.4	4	221	29.9	113	120	15.1	0.05	0.29	—
408-36-4, 37-40		37.7	10456	347	256	3020	96320	50	48.6	91	97	15.0	16	204	29.4	110	118	15.0	0.19	0.53	70
408-36-5, 44-47		39.8	8333	295	344	1084	81200	43	42.7	98	97	8.0	7.4	177	24.6	84	92	10.3	0.08	0.36	—
408-37-1, 30-35		—	9694	335	322	1062	75250	53	—	150	—	3.9	—	190	29.6	102	—	13.9	—	—	—
408-37-1, 50-52		42.4	9172	319	320	1007	78190	49	49.1	106	110	2.7	—	188	26.7	100	130	13.6	—	—	36
408-37-1, 114-120		39.3	9052	322	303	851	82950	49	48.3	106	111	2.9	—	177	27.8	98	110	11.4	—	0.02	36
409-37-2, 128-133		—	14808	398	368	1239	97440	54	—	97	—	2.3	—	211	41.4	161	—	21.5	—	—	—
408-37-3, 114-120		37.3	11750	330	258	1162	85680	53	51.3	129	134	0.9	—	184	32.0	124	123	16.0	0.02	—	—
408-38-1, 130-134		33.2	10911	291	306	1239	87220	54	52.0	153	155	1.4	—	210	30.6	117	132	16.1	—	—	—
408-38-3, 119-122		39.5	12578	356	249	1907	93800	53	49.5	121	119	1.2	—	203	34.6	149	156	19.8	—	—	47
409-7-6, 71-75		44.2	7913	376	254	1239	84280	49	49.5	86	93	1.4	—	86	33.8	73	89	4.4	—	—	—
409-7-7, 3-4		—	7613	358	244	1316	82960	50	—	86	—	1.2	—	91	30.4	72	—	5.6	—	—	—
409-8-1, 116-120		46.6	8213	568	160	1626	90440	57	48.8	59	60	5.7	—	91	33.3	78	87	5.1	—	0.14	—
409-9-1, 127-130		47.1	8693	394	115	1703	86030	56	55.1	83	69	2.5	3.2	98	37.3	90	86	5.5	—	0.09	18
409-9-3, 6-10		—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
409-9-3, 17-20		46.4	8992	—	118	1703	95550	—	50.8	—	53	4.7	—	91	35.5	91	74	7.1	—	0.11	—
409-9-3, 119-121		43.5	7613	350	152	1394	84630	50	50.5	83	80	2.3	—	86	28.8	74	73	4.6	—	—	—
409-10-1, 10-12		44.6	7793	340	143	1394	86940	51	50.7	79	80	1.9	—	89	30.9	81	76	4.9	—	—	—
409-10-2, 16-20		45.0	7194	325	141	1471	83090	50	51.5	84	82	3.7	—	94	28.7	69	93	4.2	0.037	0.06	—
409-10-2, 22-24		43.4	12662	489	13	2246	138460	61	55.8	28	27	7.9	5.1	98	76.0	193	211	14.5	0.09	0.12	34
409-10-3, 69-72		45.9	8033	338	157	1471	90300	46	47.6	68	67	4.4	2.5	94	32.2	73	93	5.9	0.037	0.09	16
409-10-4, 91-94		44.1	7374	322	161	1316	82390	51	49.8	99	83	2.0	—	87	28.6	71	67	5.4	—	—	—
409-10-5, 41-44		43.3	7913	345	156	1394	83020	51	49.7	80	76	1.1	—	90	31.2	74	91	5.7	—	—	—
409-10-6, 130-132		44.8	7374	341	153	1394	80150	51	52.4	90	92	2.9	—	88	24.9	67	83	3.8	—	—	—
409-10-7, 4-6		43.8	7553	339	165	1394	82670	51	49.8	88	82	1.4	—	86	27.3	83	71	5.1	—	—	—
409-10-8, 62-64		43.7	8513	360	159	1394	87500	55	53.3	93	94	0.7	—	86	34.6	92	79	6.1	—	—	—
409-11-1, 61-63		41.9	7050	314	158	1366	92335	48	49.4	85	84	12.9	11.1	83	29.2	63	77	4.6	0.01	0.18	—
409-11-2, 80-82		43.5	7050	314	154	1290	83006	50	50.6	93	90	1.1	—	90	29.5	75	78	3.8	—	—	—
409-11-3, 80-82		44.3	7014	328	163	1316	83216	51	52.9	95	99	1.9	—	86	27.3	70	80	3.8	—	—	—
409-11-4, 43-45		47.1	8267	347	161	1373	89111	51	51.8	98	79	1.4	—	88	35.1	94	100	6.0	—	—	10
409-12-1, 141-143		43.5	6572	324	270	1449	80257	52	52.9	107	117	4.9	—	95	26.8	60	78	3.5	—	0.11	—
409-13-1, 39-41		50.0	6791	311	265	1449	79844	54	56.9	118	115	3.9	—	95	29.4	63	83	2.4	—	0.06	—
409-13-3, 40-42		41.7	10611	397	288	1259	93730	60	53.5	120	108	3.7	—	101	41.1	110	75	10.9	0.09	—	—
409-14-1, 51-53		43.3	10611	398	312	1471	93170	54	51.6	113	106	3.8	—	104	38.1	110	121	11.5	0.06	0.17	—
409-15-1, 131-133		42.3	11390	417	245	1626	95900	49	47.9	81	75	4.2	—	132	43.6	112	118	12.7	0.03	0.08	—
409-15-1, 130-132		43.4	10551	402	287	1548	90720	53	58.0	112	112	—	2.7	—	—	—	119	—	0.02	0.05	25

<sup>1</sup>For discussion, see Wood, Varet, et al., this volume.

## APPENDIX IV – Continued

Sample (Interval in cm)	Analyst	La	Ce		Nd	Sm	Eu		Gd	Tb		Tm	Yb	Lu	Hf		Ta	Th		U	
		J	J	W	W	W	J	W	W	J	W	W	W	W	J	W	J	J	W	J	
407-35-1, 42-44		17.7	–	47.2	31.8	8.89	2.9	2.89	10.0	1.35	1.62	0.8	4.76	0.77	6.1	6.58	1.88	1.67	1.85	0.5	
407-36-3, 60-62		–	–	14.9	10.0	3.45	–	1.32	–	–	0.73	0.3	2.65	0.43	–	2.18	–	–	–	–	
407-38-2, 148-150		–	–	44.8	25.5	7.29	–	2.49	–	–	1.21	0.6	3.90	0.62	–	4.91	–	–	1.28	–	
407-39-1, 55-59		13.5	–	41.3	25.2	7.06	–	2.45	–	1.02	1.19	0.6	3.61	0.58	5.0	5.00	1.43	1.24	1.42	0.35	
407-39-2, 62-64		–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	
407-39-3, 45-47		14.8	–	–	–	–	2.3	–	–	1.05	–	–	–	–	5.1	–	1.46	1.22	–	0.32	
407-41-1, 16-20		12.6	–	–	–	–	2.23	–	–	0.99	–	–	–	–	4.9	–	1.38	1.21	–	0.33	
407-42-1, 82-89		12.9	–	35.6	24.7	6.86	2.18	2.32	–	0.98	1.18	0.5	3.49	0.57	5.0	4.84	1.40	1.28	1.27	0.44	
407-44-1, 17-19		–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	
407-45-1, 69-71		–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	
407-45-2, 40-42		–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	
407-45-3, 115-124		8.4	–	24.0	17.0	5.20	1.71	1.90	–	0.77	0.91	0.6	3.22	0.52	3.4	3.96	0.90	0.68	0.61	1.52	
407-45-4, 53-55		–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	
407-46-1, 63-65		9.1	–	–	–	–	–	1.65	–	–	0.84	–	–	–	–	–	0.83	0.68	–	1.02	
407-46-2, 59-61		–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	
407-46-3, 66-68		–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	
407-46-4, 3-5		–	–	22.0	15.7	–	–	1.75	–	–	0.94	0.7	3.11	0.52	–	3.34	–	–	–	–	
407-46-4, 68-72		9.2	–	–	–	–	–	1.68	–	–	0.86	–	–	–	–	3.6	–	0.90	0.72	–	0.57
407-47-1, 48-59		9.3	–	23.1	16.1	5.02	1.82	1.71	5.1	0.87	0.93	0.5	3.21	0.55	3.1	3.23	0.87	0.62	0.67	–	
407-47-2, 10-12		8.9	–	–	–	–	–	1.74	–	–	0.84	–	–	–	–	3.3	–	0.81	0.71	–	0.16
407-47-2, 86-88		8.6	–	–	–	–	–	1.56	–	–	0.78	–	–	–	–	3.1	–	0.79	0.60	–	0.16
407-47-3, 19-21		8.4	–	–	–	–	–	1.61	–	–	0.83	–	–	–	–	3.2	–	0.86	0.63	–	0.13
407-47-4, 39-41		9.2	–	–	–	–	–	1.65	–	–	0.83	–	–	–	–	3.2	–	0.85	0.72	–	0.23
408-35-1, 108-110		–	–	21.7	14.4	4.09	–	1.41	4.5	–	0.64	0.4	2.55	0.44	–	2.66	–	–	0.91	–	
408-36-1, 100-103		–	–	20.9	13.1	4.01	1.24	1.30	4.4	0.68	0.60	–	2.39	0.40	2.58	2.45	0.75	0.54	0.92	–	
408-36-2, 12-14		8.7	–	–	–	–	–	1.39	–	–	0.71	–	–	–	–	2.61	–	0.77	0.54	–	0.28
408-36-3, 46-49		–	–	–	–	–	–	1.36	–	–	0.68	–	–	–	–	2.68	–	0.78	0.52	–	–
408-36-4, 37-40		–	–	–	–	–	–	1.45	–	–	0.74	–	–	–	–	2.88	–	0.84	0.57	–	–
408-36-5, 44-47		–	–	–	–	–	–	1.10	–	–	0.60	–	–	–	–	2.26	–	0.63	0.41	–	–
408-37-1, 30-35		–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
408-37-1, 50-52		7.6	–	–	–	–	–	1.35	–	–	0.62	–	–	–	–	2.62	–	0.74	0.51	–	0.11
408-37-1, 114-120		–	–	–	–	–	–	1.24	–	–	0.66	–	–	–	–	2.5	–	0.69	0.49	–	–
409-37-2, 128-133		–	–	26.2	18.5	5.88	–	1.79	4.9	–	0.79	0.4	2.93	0.50	–	3.42	–	–	0.96	–	–
408-37-3, 114-120		–	–	–	–	–	–	1.59	–	–	0.78	–	–	–	–	3.14	–	0.86	0.52	–	–
408-38-1, 130-134		8.8	–	–	–	–	–	1.59	–	–	0.75	–	–	–	–	2.99	–	0.85	0.51	–	–
408-38-3, 119-122		–	–	22.2	15.7	4.47	1.76	1.54	4.7	0.88	0.80	0.4	2.62	0.42	3.44	2.87	0.97	0.56	0.42	–	–
409-7-6, 71-75		3.1	–	–	–	–	–	1.08	–	–	0.7	–	–	–	–	2.1	–	0.27	0.27	–	0.16
409-7-7, 3-4		–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
409-8-1, 116-120		–	–	–	–	–	–	1.12	–	–	0.76	–	–	–	–	2.04	–	0.30	0.25	–	–
409-9-1, 127-130		3.6	–	–	–	–	–	1.25	–	–	0.78	–	–	–	–	2.42	–	0.35	0.30	–	0.13
409-9-3, 6-10		–	–	10.7	8.5	3.56	–	1.20	–	–	0.79	0.6	2.96	0.58	–	2.20	–	–	–	–	–
409-9-3, 17-20		3.6	–	–	–	–	–	1.22	–	–	0.74	–	–	–	–	2.26	–	0.31	0.26	–	–
409-9-3, 119-121		2.1	–	–	–	–	–	0.96	–	–	0.55	–	–	–	–	1.72	–	0.25	0.24	–	–
409-10-1, 10-12		3.1	–	6.9	6.7	2.11	0.96	0.89	3.0	0.62	0.57	0.4	2.54	0.41	1.97	1.59	0.27	0.20	0.34	–	–
409-10-2, 16-20		2.9	–	–	–	–	–	0.99	–	–	0.69	–	–	–	–	1.75	–	0.248	0.20	–	–
409-10-2, 22-24		8.4	–	–	–	–	–	2.35	–	–	1.65	–	–	–	–	5.21	–	0.792	0.72	–	0.15
409-10-3, 69-72		2.83	4	–	–	–	–	1.00	–	–	0.65	–	–	–	–	2.03	–	0.37	0.23	–	0.11
409-10-4, 91-94		2.8	–	–	–	–	–	0.99	–	–	0.63	–	–	–	–	1.86	–	0.27	0.21	–	–
409-10-5, 41-44		2.9	–	–	–	–	–	0.98	–	–	0.63	–	–	–	–	1.94	–	0.28	0.19	–	–
409-10-6, 130-132		–	–	–	–	–	–	0.94	–	–	0.57	–	–	–	–	1.81	–	0.247	0.18	–	–
409-10-7, 4-6		2.7	–	–	–	–	–	1.00	–	–	0.60	–	–	–	–	2.46	–	0.275	0.31	–	–
409-10-8, 62-64		3.0	–	11.5	8.8	2.99	1.10	0.95	3.3	0.68	0.57	0.4	2.41	0.38	2.09	1.74	0.31	0.26	–	0.08	
409-11-1, 61-63		–	–	–	–	–	–	0.95	–	–	0.61	–	–	–	–	1.76	–	0.24	0.19	–	–
409-11-2, 80-82		3.1	–	–	–	–	–	0.97	–	–	0.60	–	–	–	–	1.8	–	0.254	0.17	–	–
409-11-3, 80-82		2.4	–	5.97	5.9	2.09	0.91	0.78	2.8	0.6	0.50	0.3	2.14	0.33	1.71	1.35	0.239	0.22	0.29	–	–
409-11-4, 43-45		3.2	–	–	–	–	–	1.24	–	–	0.71	–	–	–	–	2.32	–	0.314	0.24	–	–
409-12-1, 141-143		–	–	–	–	–	–	0.98	–	–	0.57	–	–	–	–	1.7	–	0.136	0.15	–	–
409-13-1, 39-41		1.8	–	5.73	5.8	2.53	1.08	0.90	3.1	0.57	0.57	0.4	2.48	0.42	1.73	1.49	0.142	0.1	0.17	–	–
409-13-3, 40-42		6.2	–	–	–	–	–	1.48	–	–	0.73	–	–	–	–	2.83	–	0.62	0.53	–	0.14
409-14-1, 51-53		5.8	–	14.3	10.8	3.64	1.43	1.24	4.4	0.82	0.78	0.5	3.21	0.54	2.83	2.48	0.61	0.58	0.62	0.09	–
409-15-1, 131-133		6.9	–	–	–	–	–	1.46	–	–	0.86	–	–	–	–	3.03	–	0.68	0.54	–	0.15
409-15-1, 130-132		6.4	–	–	–	–	–	1.37	–	–	0.94	–	–	–	–	2.93	–	0.63	0.55	–	–

APPENDIX IV – Continued

Sample (Interval in cm)	Analyst	Sc	Ti	V	Cr	Mn	Fe	Co		Ni		Rb		Sr	Y	Zr		Nb	Sb	Cs	Ba
		J	B	B	B	B	B	B	B	J	B	J	B	J	B	B	B	J	B	J	J
409-15-2, 36-38		43.0	10551	404	288	1548	92806	48	44.8	92	92	5.7	2.2	127	39.8	116	112	12.2	0.07	0.10	28
409-15-3, 105-107		43.0	9974	394	306	1507	89908	52	49.1	100	98	4.0	–	160	37.8	99	121	9.7	0.02	0.07	–
409-15-4, 64-66		45.4	10692	475	292	1442	92610	53	50.1	93	86	5.8	–	105	37.8	110	109	10.5	–	0.09	–
409-15-5, 88-92		–	10351	424	266	1502	94164	50	–	94	–	4.8	–	119	41.5	116	–	12.2	–	–	–
409-15-6, 55-59		43.9	10747	413	266	1602	94323	50	47.2	91	92	6.4	–	117	39.7	118	125	12.0	–	0.09	–
409-16-1, 120-123		–	9743	375	302	1449	91565	49	–	114	–	5.4	–	121	38.2	96	–	11.7	–	–	–
409-16-2, 15-18		49.1	9712	377	287	1548	86800	40	41.7	88	79	4.8	3.1	154	38.9	111	105	10.0	0.057	0.06	–
409-17-1, 35-40		40.8	9172	369	327	1394	85330	50	49.4	128	124	1.9	–	125	34.9	92	98	9.4	–	–	–
409-17-1, 36-40		43.2	9951	377	288	1548	94640	52	51	116	127	–	–	–	–	–	–	–	–	–	–
409-18-1, 74-78		39.8	9892	394	267	1626	92540	44	42.8	100	95	–	–	203	–	–	–	105	–	0.11	0.15
409-18-2, 106-109		42.8	–	–	–	–	–	–	48.2	–	101	–	–	–	–	–	–	111	–	0.03	0.05
409-18-2, 110-115		42.8	10191	395	281	1471	91840	50	46.9	100	102	3.3	4.5	156	38.1	101	118	10.1	0.03	0.07	–
409-18-3, 88-91		43.4	9961	386	281	1548	96180	49	47.1	108	109	5.9	4.1	105	38.1	104	105	9.6	0.03	0.13	–
409-18-3, 120-122		43.0	10071	388	289	1548	84000	49	49.8	113	115	4.8	–	155	40.8	95	104	10.8	0.04	0.07	35
409-20-1, 31-34		44.7	10191	408	327	1548	93310	54	54.4	113	105	–	–	–	–	–	132	–	0.058	0.06	40
409-21-1, 83-86		43.6	10671	402	268	1626	94360	52	51.7	118	119	2.8	–	108	40.6	105	132	12.0	0.03	–	25
409-21-2, 87-91		42.0	10671	399	273	1548	95550	52	47.9	113	106	5.9	–	101	41.4	114	114	11.3	0.03	0.11	–
409-22-1, 90-93		44.8	10191	389	251	1548	96250	52	48.3	102	93	5.6	3.7	128	39.6	104	122	11.3	0.05	0.16	20
409-23-1, 111-114		38.6	9472	377	247	1471	87640	44	44.2	116	100	6.2	–	168	37.4	93	106	11.8	0.10	0.12	–
409-23-2, 38-41		43.3	10491	405	258	1548	100730	49	45.2	84	79	9.3	7.5	104	39.6	103	139	11.3	–	0.25	–
409-24-1, 143-146		–	10131	376	273	1703	93800	50	–	109	–	4.1	–	110	38.1	112	–	10.6	–	–	–
409-24-2, 87-90		45.3	10431	377	317	1471	90510	49	49.1	106	100	4.4	5.0	103	41.8	116	126	11.5	–	–	–
409-24-3, 80-83		41.5	10251	373	313	1316	89950	49	48.4	111	104	2.5	–	105	36.9	105	106	11.3	–	–	–
409-24-4, 89-92		45.2	10371	393	296	1394	93730	50	50.1	109	108	2.4	–	104	37.6	106	109	10.5	–	–	–
409-24-5, 69-72		42.3	10491	378	297	1316	90580	49	49.5	111	108	2.5	–	108	36.7	93	115	10.6	–	–	–
409-24-6, 79-82		41.9	11091	399	246	1316	96670	52	50.4	105	114	1.5	–	108	41.9	100	103	11.5	0.077	0.03	31
409-24-7, 56-59		41.5	10131	383	275	1394	87150	50	49.5	115	112	2.5	–	101	38.0	107	119	10.1	–	–	–
409-25-1, 82-85		41.3	10551	344	263	1703	102200	52	48.5	118	109	9.6	7.6	108	43.9	125	123	12.2	0.04	0.12	41
409-25-2, 35-38		39.7	7553	295	471	1316	80430	49	48.5	142	151	3.2	2.0	103	30.0	80	88	6.2	–	0.07	–
409-25-3, 79-82		41.7	9832	383	276	1471	90860	52	49.3	97	91	–	–	–	–	–	109	–	–	0.06	–
409-25-4, 102-105		43.8	10071	397	267	1548	95270	44	43.6	80	79	–	–	–	–	–	90	–	–	0.11	–
409-26-1, 29-32		43.4	10971	409	245	1626	98980	52	47.5	92	82	5.1	–	109	42.2	115	113	12.3	0.03	–	–
409-28-1, 73-76		–	9832	381	248	1471	89320	39	–	95	–	6.4	–	138	36.8	101	–	10.7	–	–	–
409-31-1, 29-32		44.8	10611	–	–	1471	90930	–	50.2	–	100	7.4	6.7	100	36.4	101	121	11.2	0.031	0.21	19
409-31-1, 121-124		42.0	10191	377	244	1471	91840	56	52.6	113	110	3.9	–	103	41.3	104	118	10.9	–	0.09	–
409-31-2, 80-83		–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
409-32-1, 135-138		43.1	–	–	–	–	–	–	48.5	–	99	–	–	–	–	–	68	–	0.073	0.05	–
410-37-1, 88-90		–	8453	265	189	1084	65590	35	–	103	–	10.6	–	228	25.0	108	–	28.9	–	–	–
410-39-4, 55-58		26.7	11694	260	206	1316	63000	32	34.0	108	108	44.3	41	478	28.9	206	217	77.2	0.02	0.81	480
410-39-4, 110-114		–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
410-39-5, 51-55		–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
410-41-2, 55-60		18.5	6065	158	138	1239	48300	22	23.9	92	84	27.2	24.8	507	24.8	234	221	93.2	0.12	0.42	562
410A-1-7, 1-3		–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
410A-2-4, 35-40		–	8393	279	233	1316	63980	39	–	126	–	–	–	–	–	–	–	–	–	–	–
410A-2-5, 11-14		–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
410A-2-5, 88-92		31.2	8393	295	225	929	64680	39	37.9	126	125	6.6	1.6	235	26.6	104	125	29.7	0.033	0.26	–
410A-3-1, 55-57		–	8093	261	202	774	62020	35	–	113	–	6.2	–	230	25.5	107	–	28.8	–	–	–
410A-3-2, 48-52		–	8932	251	250	1161	64330	33	–	114	–	13.7	–	307	27.1	125	–	39.0	–	–	–
410A-3-2, 111-114		–	8213	251	265	851	62720	41	–	146	–	5.2	–	302	24.1	112	–	36.6	–	–	–
410A-3-3, 3-8		28.6	8693	246	277	929	63560	43	42.3	164	162	–	–	–	–	–	137	–	0.08	0.068	150
410A-3-3, 120-129		29.8	8812	257	276	1006	64820	40	40.7	154	150	–	5.0	–	–	–	169	–	0.04	0.10	196
410A-3-4, 3-5		28.0	8513	241	257	1006	63700	39	39.4	148	144	–	10.1	–	–	–	129	–	0.076	0.15	184
410A-3-4, 116-119		29.7	8693	271	309	1006	63140	35	35.5	128	135	–	2.9	–	–	–	116	–	–	0.09	154
410A-3-5, 47-50		18.5	8693	245	269	1084	59150	42	28.3	160	102	4.2	–	319	23.4	125	85	37.3	0.036	0.048	142
410A-4-1, 53-60		28.4	8393	244	263	929	62860	40	39.8	144	148	–	6.2	–	–	–	134	–	0.06	0.09	193
410A-4-1, 110-115		–	8992	257	270	929	63210	41	–	151	–	3.1	–	310	24.0	107	–	41.0	–	–	–
410A-4-2, 7-10		–	8033	255	272	929	65170	37	–	137	–	–	–	–	–	–	–	–	–	–	–
410A-4-2, 87-93		–	8453	244	291	851	62440	35	–	146	–	–	–	–	–	–	–	–	–	–	–
410A-4-3, 130-132		–	8633	256	272	1006	63210	35	–	137	–	–	–	–	–	–	–	–	–	–	–
410A-4-4, 65-70		29.1	8752	261	290	1006	63980	38	38.8	149	148	6.8	5.5	320	24.6	121	131	35.4	0.045	0.25	168



## APPENDIX IV – Continued

Sample (Interval in cm)	Analyst	Sc	Ti	V	Cr	Mn	Fe	Co		Ni		Rb		Sr	Y	Zr		Nb	Sb	Cs	Ba	
		J	B	B	B	B	B	B	J	B	J	B	J	B	B	B	J	B	B	J	J	J
410A-5-1, 69-76		–	8693	275	288	1161	64190	36	–	140	–	–	–	–	–	–	–	–	–	–	–	–
410A-5-2, 105-119		–	8932	283	278	1006	64960	39	–	120	–	5.4	–	321	26.4	130	–	39.6	–	–	–	–
410A-5-3, 38-45		–	8393	265	285	929	64890	35	–	142	–	7.4	–	306	24.4	115	–	35.2	–	–	–	–
410A-5-4, 95-106		28.5	8513	278	298	1161	61020	34	35.1	120	123	15.3	15	260	25.2	120	133	37.7	0.22	0.05	0.05	230
410A-6-1, 118-126		35.6	10671	311	231	1316	70070	35	35.9	79	76	–	80	–	–	–	184	–	0.05	0.15	0.15	247
410A-6-2, 122-132		–	8752	245	270	1239	66920	40	–	156	–	–	–	–	–	–	–	–	–	–	–	–
410A-6-3, 2-8		–	8513	251	301	1084	63910	37	–	170	–	–	–	–	–	–	–	–	–	–	–	–
411-1-1, 30-32		–	4196	208	589	1316	71680	55	–	264	–	2.2	–	80	19.7	39	–	4.1	–	–	–	–
411-1-1, 78-82		39.6	4184	202	553	1294	70392	54	56.4	265	285	0.7	–	81	18.7	44	42	4.9	–	–	–	–
411-2-2, 2-13		–	4256	201	540	1316	71360	54	–	263	–	0.6	–	82	22.2	41	–	5.3	–	–	–	–
411-3-1, 44-46		39	4376	215	551	1394	72170	54	54.6	248	264	3.5	–	80	22.3	42	55	4.8	–	–	–	–
411-3-1, 96-100		37.1	5710	281	278	1294	70664	49	49.4	92	93	6.9	6.2	117	23.4	47	71	10.0	–	0.12	–	–
411-3-1, 134-136		–	5755	237	183	1161	66920	37	–	72	–	6.9	–	124	24.0	60	–	8.5	–	–	–	–
411-4-1, 68-70		–	5640	235	177	1214	64895	34	–	76	–	4.0	–	124	23.2	46	–	10.0	–	–	–	–
411-5-1, 22-28		37.5	5815	270	275	1239	68460	47	49.9	95	97	5.1	4.5	118	24.1	55	75	10.3	–	0.038	–	–
412-14CC, 2-8		35.4	5815	240	348	1394	67760	41	43.1	109	105	–	4.1	–	–	–	–	–	–	0.17	–	–
412-14CC, 37-42		37.8	6294	278	93	1316	76370	46	47.8	74	76	–	3.8	–	–	–	46	–	0.024	0.11	0.11	42
412-15-1, 50-56		35.9	5755	257	367	1084	67410	41	44.4	121	123	5.5	1.8	124	22.1	53	54	10.4	0.015	0.03	0.03	73
412-15-1, 62-68		37.4	6175	274	256	1239	67480	47	49.6	115	116	–	4.2	–	–	–	76	–	0.024	0.074	0.074	49
412A-1-1, 30-32		37.3	6294	281	525	1316	75460	47	48	209	79	3.6	–	111	25.0	58	–	9.7	–	–	–	45
412A-2-1, 18-22		36.1	5875	254	352	1161	68040	42	43.6	122	123	5.5	3.7	119	22.0	59	62	10.8	–	0.07	–	41
412A-3-1, 7-10		38.8	6534	273	92	1394	73780	45	46.8	70	71	4.9	–	112	25.0	65	61	10.4	0.025	0.04	0.04	51
412A-3-1, 36-41		–	5875	–	–	1239	65800	–	–	–	–	5.1	–	118	22.4	55	–	10.2	–	–	–	–
412A-3-1, 70-80		35.3	5755	254	297	1161	68040	42	41.9	105	105	2.4	3.3	119	–	–	55	9.5	0.02	–	–	47
412A-3-2, 70-80		39.0	5875	–	–	1161	72030	–	49.7	–	166	–	–	–	–	–	45	–	–	–	–	45
412A-3-3, 27-30		38.3	7673	293	158	1394	81830	44	44.9	83	81	4.5	7.1	–	–	–	72	–	–	0.14	–	52
412A-4-1, 20-25		40.6	7673	297	157	1394	80430	45	47.4	82	84	3.7	2.3	124	29.0	83	77	14.1	–	0.045	–	52
412A-4-1, 40-44		39.6	7194	–	153	1316	77210	–	47.4	–	95	3.5	–	114	27.1	75	76	8.7	0.137	0.02	0.02	46
412A-5-1, 50-54		–	6294	269	92	1239	76020	48	–	80	–	3.4	–	119	25.9	62	–	11.3	–	–	–	–
412A-5-1, 91-94		38.9	6954	294	100	1394	73780	46	47.6	78	68	6.5	–	123	27.5	76	67	12.8	–	–	–	49
412A-6-1, 70-73		39.5	5695	271	111	1316	72940	46	48.1	69	72	2.2	–	120	23.3	61	62	10.3	–	0.031	–	50
412A-7-1, 2-5		–	5935	268	107	1394	73360	45	–	73	–	3.3	–	122	24.1	47	–	11.0	–	–	–	–
412A-7-2, 60-62		39.3	5935	276	111	1239	73080	47	49.1	77	77	4.0	2.3	121	23.6	48	77	9.3	–	0.035	–	48
412A-7-2, 110-115		39.8	5995	262	97	1394	71610	47	49.7	68	68	5.3	3.7	124	24.3	50	62	9.7	0.007	0.117	0.117	48
412A-8-1, 130-135		39.3	5875	271	103	1316	75110	46	48.5	76	79	3.6	2.9	121	25.1	51	76	9.6	–	0.031	–	50
412A-8-2, 35-39		39.4	5875	–	–	1239	73780	–	47.6	–	72	2.4	–	120	24.4	48	–	9.1	–	–	–	–
412A-9-1, 62-72		–	5875	–	–	1394	71680	–	–	–	–	5.4	–	120	23.7	52	–	10.5	–	–	–	–
412A-10-1, 50-51		39.3	6175	–	–	1239	73710	–	47.2	–	65	2.4	–	118	25.2	55	61	10.6	–	0.018	–	44
412A-11-1, 32-35		38.2	5575	244	140	1161	70350	45	47.2	92	96	1.4	–	113	22.7	47	54	8.9	–	0.031	–	48
412A-11-2, 17-21		40.1	5395	250	151	1161	67620	44	45.6	84	86	2.4	–	119	21.1	48	58	8.0	–	0.025	–	35
412A-12-1, 10-15		38.7	5455	239	136	1239	67760	45	46.5	92	86	–	3.7	–	–	–	50	–	0.07	0.25	0.25	30
412A-13-1, 20-25		–	6115	273	62	1316	76020	47	–	70	–	2.7	–	113	23.8	51	–	9.0	–	–	–	–
412A-13-2, 55-60		37.4	6175	269	56	1394	77280	46	80.6	67	58	3.3	–	116	25.6	50	39	10.5	–	–	–	34
412A-13-3, 31-36		39.2	6194	282	71	1394	75950	46	47.6	68	64	–	–	–	–	–	63	–	–	–	–	39
412A-14-1, 4-14		38.2	–	–	–	–	–	–	47.2	–	81	–	2.5	–	–	–	60	–	0.017	0.03	0.03	46
412A-14-4, 123-125		–	5575	236	133	1116	63770	44	–	85	–	2.1	–	126	21.1	46	–	9.9	–	–	–	–
412A-14-5, 22-29		–	5515	237	141	1161	66850	43	–	89	–	–	–	–	–	–	–	–	–	–	–	–
413-1-2, 35-40		37.5	8693	265	536	1161	67130	45	46.6	194	199	7.1	5.1	241	25.8	108	130	26.8	0.06	0.13	0.13	94
413-1-2, 124-129		33.2	9472	–	–	1161	70700	–	50.4	–	248	7.3	5.5	238	27.1	114	132	32.3	0.06	0.15	0.15	116
413-2-1, 42-46		35.2	8752	268	631	1161	68880	50	51.5	264	273	6.5	–	234	25.1	107	107	27.7	0.05	0.16	0.16	105
413-3-1, 44-48		36.6	8573	260	594	1239	68880	45	50.0	231	245	14.0	13.4	228	24.1	104	116	28.1	0.031	0.14	0.14	154
413-5-1, 20-22		–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

## APPENDIX IV – Continued

Sample (Interval in cm)	Analyst	La		Ce		Nd		Sm		Eu		Gd		Tb		Tm		Yb		Lu		Hf		Ta		Th		U	
		J	W	J	W	J	W	J	W	J	W	J	W	J	W	J	W	J	W	J	W	J	W	J	W	J	W	J	W
410A-5-1, 69-76		–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
410A-5-2, 105-119		–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
410A-5-3, 38-45		–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
410A-5-4, 95-106		20.0	–	–	–	–	–	1.36	–	–	–	0.57	–	–	–	–	–	–	–	2.8	–	2.16	2.68	–	–	–	–	0.71	
410A-6-1, 118-126		26.1	–	–	–	–	–	1.78	–	–	–	0.76	–	–	–	–	–	–	–	3.5	–	2.87	3.49	–	–	–	–	0.64	
410A-6-2, 122-132		–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	
410A-6-3, 2-8		–	–	43.3	21.0	4.45	–	1.53	4.8	–	0.70	0.4	2.21	0.32	–	2.99	–	–	–	–	–	–	–	–	–	–	3.24	–	
411-1-1, 30-32		–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	
411-1-1, 78-82		2.4	–	6.3	4.9	1.79	0.66	0.72	2.2	0.44	0.47	0.3	2.17	0.39	1.07	1.00	0.228	0.28	0.35	–	–	–	–	–	–	–	–	–	
411-2-2, 2-13		–	–	6.2	4.6	1.63	–	0.69	2.4	–	0.39	0.3	2.15	0.38	–	1.01	–	–	–	–	–	–	–	–	–	–	–	0.66	
411-3-1, 44-46		2.7	–	–	–	–	–	0.73	–	–	–	0.45	–	–	–	1.06	–	0.242	0.29	–	–	–	–	–	–	–	–	–	
411-3-1, 96-100		5.8	–	–	–	–	–	0.88	–	–	–	0.53	–	–	–	–	–	1.45	–	0.605	0.69	–	–	–	–	–	–	–	
411-3-1, 134-136		–	–	11.4	8.1	2.24	–	0.87	2.7	–	0.53	0.4	2.02	0.34	–	1.38	–	–	–	–	–	–	–	–	–	–	0.61	–	
411-4-1, 68-70		–	–	11.7	7.8	2.48	–	0.91	2.7	–	0.48	0.3	2.24	0.37	–	1.47	–	–	–	–	–	–	–	–	–	–	0.90	–	
411-5-1, 22-28		6.3	–	13.7	8.6	2.43	0.87	0.91	2.5	0.55	0.54	0.4	2.18	0.37	1.48	1.49	0.62	0.64	0.73	0.20	–	–	–	–	–	–	–	–	
412-14CC, 2-8		–	–	–	–	–	–	0.86	–	–	–	0.48	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	
412-14CC, 37-42		5.5	9	12.7	8.5	2.53	0.93	0.93	3.1	0.54	0.53	0.3	2.09	0.35	1.63	1.69	0.59	0.63	0.70	0.18	–	–	–	–	–	–	–	–	
412-15-1, 50-56		5.0	9	12.7	8.6	2.59	0.91	0.94	3.3	0.46	0.56	0.3	2.29	0.37	1.48	1.55	0.54	0.59	0.72	0.16	–	–	–	–	–	–	–	–	
412-15-1, 62-68		5.9	11	–	–	–	–	0.95	–	–	–	0.51	–	–	–	1.64	–	0.62	0.68	–	0.25	–	–	–	–	–	–	–	
412A-1-1, 30-32		5.7	11	–	–	–	–	0.88	–	–	–	0.50	–	–	–	1.63	–	0.58	0.63	–	0.10	–	–	–	–	–	–	–	
412A-2-1, 18-22		5.4	12	13.2	7.8	2.40	0.87	0.91	3.2	0.47	0.51	0.3	2.18	0.36	1.52	1.53	0.55	0.61	0.74	0.10	–	–	–	–	–	–	–	–	
412A-3-1, 7-10		6.1	–	–	–	–	–	0.96	–	–	–	0.57	–	–	–	1.71	–	0.61	0.67	–	–	–	–	–	–	–	–	–	
412A-3-1, 36-41		–	–	12.7	8.2	2.52	–	0.93	2.9	–	0.53	0.3	2.18	0.37	–	1.52	–	–	–	–	–	–	–	–	–	–	0.65	–	
412A-3-1, 70-80		4.8	–	–	–	–	–	0.87	–	–	–	0.46	–	–	–	1.48	–	0.535	0.54	–	–	–	–	–	–	–	–	–	
412A-3-2, 70-80		5.0	10	–	–	–	–	0.92	–	–	–	0.46	–	–	–	1.44	–	0.52	0.56	–	0.16	–	–	–	–	–	–	–	
412A-3-3, 27-30		8.0	17	–	–	–	–	1.1	–	–	–	0.61	–	–	–	2.09	–	0.81	0.86	–	0.20	–	–	–	–	–	–	–	
412A-4-1, 20-25		7.4	17	–	–	–	–	1.16	–	–	–	0.69	–	–	–	2.08	–	0.81	0.87	–	0.14	–	–	–	–	–	–	–	
412A-4-1, 40-44		7.0	–	–	–	–	–	1.06	–	–	–	0.68	–	–	–	1.99	–	0.73	0.79	–	–	–	–	–	–	–	–	–	
412A-5-1, 50-54		–	–	12.9	8.4	2.50	–	0.94	2.7	–	0.51	0.4	2.35	0.41	–	1.55	–	–	–	–	–	–	–	–	–	–	1.02	–	
412A-5-1, 91-94		6.1	12	–	–	–	–	0.91	–	–	–	0.48	–	–	–	1.57	–	0.57	0.59	–	0.14	–	–	–	–	–	–	–	
412A-6-1, 70-73		5.5	11	–	–	–	–	0.88	–	–	–	0.49	–	–	–	1.53	–	0.57	0.65	–	0.11	–	–	–	–	–	–	–	
412A-7-1, 2-5		–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	
412A-7-2, 60-62		5.7	11	12.5	8.9	2.34	0.79	0.92	3.2	0.48	0.49	0.4	2.21	0.40	1.47	1.51	0.57	0.62	–	–	–	–	–	–	–	–	–	–	
412A-7-2, 110-115		5.7	11	–	–	–	–	0.95	–	–	–	0.49	–	–	–	1.5	–	0.58	0.65	–	0.21	–	–	–	–	–	–	–	
412A-8-1, 130-135		5.4	11	–	–	–	–	0.84	–	–	–	0.49	–	–	–	1.49	–	0.57	0.64	–	0.13	–	–	–	–	–	–	–	
412A-8-2, 35-39		–	–	–	–	–	–	0.85	–	–	–	0.47	–	–	–	1.47	–	0.54	0.62	–	–	–	–	–	–	–	–	–	
412A-9-1, 62-72		–	–	13.0	9.2	2.70	–	0.96	2.7	–	0.51	0.4	2.35	0.39	–	1.53	–	–	–	–	–	–	–	–	–	–	–	–	
412A-10-1, 50-51		4.9	11	–	–	–	–	0.94	–	–	–	0.49	–	–	–	1.53	–	0.51	0.56	–	0.13	–	–	–	–	–	–	–	
412A-11-1, 32-35		4.6	9	–	–	–	–	0.81	–	–	–	0.45	–	–	–	1.38	–	0.46	0.51	–	–	–	–	–	–	–	–	–	
412A-11-2, 17-21		4.0	9	–	–	–	–	0.78	–	–	–	0.5	–	–	–	1.35	–	0.44	0.48	–	–	–	–	–	–	–	–	–	
412A-12-1, 10-15		4.6	10	–	–	–	–	0.83	–	–	–	0.51	–	–	–	1.47	–	0.45	0.49	–	0.54	–	–	–	–	–	–	–	
412A-13-1, 20-25		–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	
412A-13-2, 55-60		5	10	12.4	8.6	2.73	1.00	0.99	3.1	0.49	0.52	0.4	2.41	0.44	1.57	1.56	–	0.55	–	–	–	–	–	–	–	–	–	–	
412A-13-3, 31-36		5.2	11	–	–	–	–	0.91	–	–	–	0.49	–	–	–	1.58	–	0.525	0.57	–	0.22	–	–	–	–	–	–	–	
412A-14-1, 4-14		5.5	9	–	–	–	–	0.90	–	–	–	0.50	–	–	–	1.63	–	0.574	0.62	–	0.18	–	–	–	–	–	–	–	
412A-14-4, 123-125		–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	
412A-14-5, 22-29		–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	
413-1-2, 35-40		14.5	–	–	–	–	–	1.32	–	–	–	0.64	–	–	–	2.61	–	1.56	1.52	–	0.16	–	–	–	–	–	–	–	
413-1-2, 124-129		16.0	–	27.8	14.8	3.41	1.41	1.24	4.0	0.53	0.62	0.3	2.03	0.33	2.84	2.37	1.80	1.76	1.52	0.24	–	–	–	–	–	–	–	–	
413-2-1, 42-46		14.4	–	–	–	–	–	1.26	–	–	–	0.55	–	–	–	2.61	–	1.59	1.51	–	0.24	–	–	–	–	–	–	–	
413-3-1, 44-48		14.6	27	30.7	16.5	4.09	1.27	1.34	4.4	0.58	0.68	0.4	2.16	0.40	2.7	2.68	1.61	1.53	1.82	0.37	–	–	–	–	–	–	–	–	
413-5-1, 20-22		–	–	4.5	4.5	1.69	–	0.67	2.6	–	0.48	0.3	2.32	0.35	–	0.95	–	–	–	–	–	–	–	–	–	–	–	–	