Appendix 2-4 Results of X-Ray Diffraction Analysis

Appendix 2-4 Results of X-Ray Diffraction Analysis

	Sample no.	Locality	Rock description	Qz	Pl	K-f	Smc	Ill	Kol	Chl	Cal	Goth	Hm	Ilm	Psr	Ant	Rut	Zr
1	KARAOTKEL	Pit 1	clay	○	△	◎			◎									
2	KARAOTKEL	Pit 2	Ilmenite concentrate	◎	▪								△	△	◎		△	◎
3	MJBKE-8	41.4m	clay	◎			○	○	◎									
4	MJBKE-8	50.4m	clay	◎			△	△	◎									
5	MJBKE-8	57.8m	clay	◎	○		○	○	◎									
6	MJBKE-25	23.7m	Ilmenite concentrate	◎									▪	◎				◎
7	MJBKE-26	21.2m	clay	◎	○		◎		◎									
8	MJBKS-32	10.0m	clay	◎	△	▪	○	△		▪	△					▪		
9	MJBKS-32	20.0m	clay	◎			◎		△							▪		
10	MJBKS-32	32.5m	clay	◎		△	△		△							▪	▪	
11	MJBKS-32	35.6m	clay	◎					▪					▪			△	
12	MJBKS-32	38.0m	clay	◎			◎	○	△			▪				△		
13	MJBKE-33	13.7m	Ilmenite concentrate	◎										◎				◎

[Abundance]
◎: Abundant, ○: Common, △: Poor, ▪: Rare

[Abbreviations]

Qz=Quartz	Ill=Illite	Goth=Goethite	Ant=Anatase
Pl=Plgioclase	Kol=Kaolinite	Hm=Hematite	Rut=Rutile
K-f=K-Feldspar	Chl=Chlorite	Il=Ilmenite	Zr=Zircon
Smc=Smectite	Cal=Calcite	Psr=Pseudoritile	

Appendix 2-5 The Results of Whole Rock Analysis

Appendix 2-5 The Results of Whole Rock Analysis

	G370	G378	G396	G416	G433	G442	G449	G450	I162	I173	I178	I190	I212	I232	G423
SAMPLE LOCATION	48° 46'41"N	48° 46'34"N	48° 46'54"N	48° 46'33"N	48° 45'05"N	48° 44'51"N	48° 46'12"N	48° 42'65"N	48° 47'01"N	48° 47'15"N	48° 47'19"N	48° 46'56"N	48° 46'05"N	48° 42'26"N	48° 48'24"N
	83° 05'17"E	83° 05'42"E	83° 08'21"E	83° 08'39"E	83° 01'32"E	83° 01'41"E	83° 02'18"E	83° 09'86"E	83° 06'04"E	83° 06'46"E	83° 06'21"E	83° 06'54"E	83° 02'28"E	83° 03'10"E	82° 54'47"E
LITHOLOGICAL NAME	GRANITE	GRANITE	SYENITE	GRANITE	GRANITE	GRANITE	GRANITE	SYENITE	GRANITE	GRANITE	GRANITE	SYENITE	SYENITE	GRANITE	MNZ
Magnetic Susceptibility*	0.16	0.30	0.16	0.06	0.95	0.12	0.09	0.12	0.17	0.23	0.39	0.54	0.1	0.19	0.38
SiO_2	70.26	64.08	66.44	71.96	71.88	69.12	72.66	62.94	73.93	72.61	71.32	64.08	63.84	72.42	58.46
TiO_2	0.25	0.36	0.22	0.20	0.240	0.37	0.14	0.61	0.26	0.25	0.21	0.37	0.34	0.24	0.99
Al_2O_3	14.36	16.43	16.7	13.81	13.6	14.45	12.79	17.47	13.64	13.83	14.16	16.47	15.3	13.64	17.91
Fe_2O_3	2.95	4.77	3.07	1.73	1.95	3.66	3.08	3.24	1.33	2.44	1.91	4.37	1.59	0.86	7.83
FeO	0.13	2.36	1.64	0.42	0.58	1.94	0.13	2.00	0.50	0.92	0.36	2.00	0.13	0.13	5.09
MnO	0.045	0.1	0.053	0.024	0.058	0.07	0.063	0.094	0.022	0.053	0.045	0.08	0.045	0.015	0.21
MgO	0.12	0.18	0.12	0.083	0.14	0.46	0.26	0.64	0.075	0.1	0.079	0.17	0.11	0.13	0.7
CaO	0.73	1.37	1.03	0.31	0.66	1.62	0.82	1.86	0.39	0.62	0.41	1.33	1.01	0.56	3.05
Na_2O	4.54	5.54	5.47	4.46	4.54	4.74	3.54	5.78	4.43	4.28	4.47	5.39	3.83	4.44	5.91
K_2O	5.26	6.78	5.9	5.12	5	4.92	4.42	5.7	5.3	5.21	5.29	5.56	6.02	4.98	3.11
P_2O_5	0.05	0.045	0.04	0.036	0.039	0.12	0.064	0.21	0.045	0.034	0.032	0.044	0.039	0.036	0.19
CO_2															
$H_2O(+)$															
$H_2O(-)$															
LOI		0.3		0.15	0.15			0.3		0.8	0.3	0.3			1
Total	98.69	102.32	100.68	98.30	98.84	101.47	97.96	100.84	99.92	101.15	98.59	100.16	92.25	97.45	104.45
Solidification Index	0.9	0.9	0.8	0.7	1.2	3.0	2.3	3.8	0.7	0.8	0.7	1.0	1.0	1.2	3.2
SiO_2/Al_2O_3	8.3	6.6	6.8	8.8	9.0	8.1	9.6	6.1	9.2	8.9	8.5	6.6	7.1	9.0	5.5
$CaO+Na_2O/K_2O$	1.3	1.3	1.4	1.3	1.4	1.5	1.2	1.6	1.3	1.3	1.3	1.5	1.0	1.4	2.9
K_2O/Na_2O+K_2O	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.4	0.4	0.4	0.4	0.4	0.5	0.4	0.3
K_2O/Na_2O	0.8	0.8	0.7	0.8	0.7	0.7	0.8	0.6	0.8	0.8	0.8	0.7	1.0	0.7	0.3
FeO/Fe_2O_3	0.1	1.1	1.2	0.5	0.7	1.2	0.1	1.4	0.8	0.8	0.4	1.0	0.2	0.3	1.4
R1 (Richard etal.(1985))	1753	522	975	1951	1935	1615	2464	655	2057	2004	1862	879	1432	2051	705
R2 (Richard etal.(1985))	366	478	444	308	344	480	352	573	313	343	326	474	414	334	712
Modal opaque minerals	0.4	0.7	0.3	0.5	0.7	1.0	0.5	1.5	0.7	1.0	0.5	0.5	0.5	0.3	3.0

Appendix 2-6 The Results of Minor Element Analysis

Appendix 2-6 The Results of Minor Element Analysis

SAMPLE NUMBER	G370	G378	G396	G416	G433	G442	G449	G450	I162	I173	I178	I190	I212	I232	G423
SAMPLE LOCATION	48°46'41"N	48°46'34"N	48°46'54"N	48°46'33"N	48°45'05"N	48°44'51"N	48°46'12"N	48°42'65"N	48°47'01"N	48°47'15"N	48°47'19"N	48°46'56"N	48°46'05"N	48°42'26"N	48°48'24"N
	83°05'17"E	83°05'42"E	83°08'21"E	83°08'39"E	83°01'32"E	83°01'41"E	83°02'18"E	83°09'86"E	83°06'04"E	83°06'46"E	83°06'21"E	83°06'54"E	83°02'28"E	83°03'10"E	82°54'47"E
LITHOLOGICAL NAME	GRANITE	GRANITE	SYENITE	GRANITE	GRANITE	GRANITE	GRANITE	SYENITE	GRANITE	GRANITE	GRANITE	SYENITE	SYENITE	GRANITE	MNZ
Magnetic Susceptibility*	0.46	1.69	35.5	4.67	0.1	0.2	11	0.09	3.66	3.57	2.38	6.32	0.4	4.86	1.98
Ag(ppm)	<1.0	<1.0	<1.0	<1.0	<1.0	1.0	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Ba(ppm)	148.5	97.7	84.8	46.3	223	365	185	867	92.9	66.1	66.6	82.8	54.5	333	8180
Ce(ppm)	204	85.2	38.6	126.5	145	118	99.7	61.6	135.5	207	144.5	59.5	81.4	131	45.1
Co(ppm)	1	1.1	1.2	1.5	1.2	3.8	2.6	4.9	0.9	0.9	0.9	1.2	0.8	2.2	4
Cr(ppm)	30	30	40	80	40	120	110	20	20	20	20	20	30	20	20
Cs(ppm)	1.1	1	1.5	1	2.1	2	3.6	1.2	1.6	0.7	0.8	1.8	1.2	1.2	0.7
Cu(ppm)	10	12	8	107	24	73	154	13	10	13	19	18	15	13	18
Dy(ppm)	6.4	7.3	4.5	6.8	10.2	8.8	10.1	5.4	4.7	7.7	5.3	6.6	4.9	9	4.1
Er(ppm)	3.6	4.3	2.9	3.8	5.8	5.4	7.6	3.3	2.5	4.2	2.9	4	2.8	4.4	2.3
Eu(ppm)	0.4	0.3	0.3	0.2	0.50	0.8	0.4	2.1	0.2	0.2	0.2	0.2	0.2	1.4	6.3
Ga(ppm)	28	29	28	27	31	28	31	24	27	27	27	28	28	27	22
Gd(ppm)	10.1	8.4	4.7	9.9	11.6	10	9	6.2	7.9	12.5	8.5	7.2	7.5	12.2	5.2
Hf(ppm)	13	31	25	12	14	12	12	14	14	15	14	29	29	9	4
Ho(ppm)	1.3	1.5	1	1.4	2	1.9	2.3	1.1	0.9	1.5	1	1.4	1	1.7	0.8
La(ppm)	96.2	35.4	19.1	75	66.5	53.4	44.8	28.4	60.4	102	62.3	23.6	49.8	52.8	19.9
Lu(ppm)	0.6	0.8	0.5	0.6	0.8	0.8	1.2	0.5	0.4	0.7	0.5	0.8	0.5	0.5	0.4
Mo(ppm)	1	2	3	2	1	11	3	2	1	2	1	1	1	1	1
Nb(ppm)	16	19	15	15	25	21	23	14	18	18	15	24	21	15	15
Nd(ppm)	79.4	46.3	23.1	66.9	64.1	53.2	42.7	31.6	58.3	92.1	57.9	33.6	52.5	61.9	25.1
Ni(ppm)	6	6	19	14	7	51	17	7	7	7	7	7	7	9	5
Pb(ppm)	69	107	39	269	221	407	822	102	42	60	121	97	121	95	95
Pr(ppm)	22.7	11.3	5.7	17.5	17.3	14.2	11.7	7.8	16	25.1	15.8	7.8	13.8	15.5	5.8
Rb(ppm)	82.1	56.1	75.8	72.8	128	105	173.5	52.1	81.4	72.2	72.2	70	86.4	78.2	28.3
Sm(ppm)	11.8	9.6	5.1	11.2	12.4	10.5	8.7	6.5	9.7	14.6	9.5	7.8	9.5	13.1	5.5
Sn(ppm)	4.0	4.0	4.0	17.0	9.0	10.0	30.0	4.0	3.0	3.0	3.0	4.0	4.0	5.0	3.0
Sr(ppm)	32.7	35.1	21.9	12.1	53.5	132	52.8	244	24.7	16.1	15.5	24	21.1	108.5	344
Ta(ppm)	0.8	0.8	0.7	0.7	1.5	1.3	1.7	0.7	0.8	0.7	0.6	1.0	0.9	0.8	0.8
Tb(ppm)	1.3	1.3	0.8	1.4	1.9	1.6	1.6	1	1	1.6	1.1	1.2	1	1.8	0.8
Th(ppm)	7	4	2	5	10	9	23	3	7	7	6	4	5	5	2
Tl(ppm)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Tm(ppm)	0.5	0.6	0.25	0.5	0.8	0.8	1.2	0.5	0.25	0.6	0.25	0.6	0.25	0.6	0.25
U(ppm)	1.0	2.0	0.8	1.0	2.7	2.4	5.3	1.2	1.0	1.0	1.1	1.3	1.6	2.3	0.7
V(ppm)	15	12	15	11	12	26	12	32	16	13	12	16	16	19	92
W(ppm)	2	2	2	3	3	4	4	3	2	3	2	3	3	3	2
Y(ppm)	31.6	36.3	24.2	34.3	54.9	50.3	68.7	28.5	20.5	33.9	22.6	34.3	22.6	37.7	21.2
Yb(ppm)	3.5	4.7	3.3	3.4	5.2	5.1	8.1	3	2.2	3.9	2.9	4.4	2.8	3.7	2.2
Zn(ppm)	386	562	198	1310	1125	1125	2880	351	202	292	542	462	711	416	439
Zr(ppm)	554	1355	1050	526	468	413	260	636	599	657	609	1245	1260	332	167.5
Y+Nb(ppm)	47.6	55.3	39.2	49.3	79.9	71.3	91.7	42.5	38.5	51.9	37.6	58.3	43.6	52.7	36.2
Yb+Ta(ppm)	4.3	5.5	4.0	4.1	6.7	6.4	9.8	3.7	3.0	4.6	3.5	5.4	3.7	4.5	3.0

Appendix 2-7 The Results of CIPW Normative Constituent

Appendix 2-7 The Results of CIPW Normative Constituents

SAMPLE NUMBER	G370	G378	G396	G416	G433	G442	G449	G450	I162	I173	I178	I190	I212	I232	G423
SAMPLE LOCATION	48° 46'41"N	48° 46'34"N	48° 46'54"N	48° 46'33"N	48° 45'05"N	48° 44'51"N	48° 46'12"N	48° 42'65"N	48° 47'01"N	48° 47'15"N	48° 47'19"N	48° 46'56"N	48° 46'05"N	48° 42'26"N	48° 48'24"N
	83° 05'17"E	83° 05'42"E	83° 08'21"E	83° 08'39"E	83° 01'32"E	83° 01'41"E	83° 02'18"E	83° 09'86"E	83° 06'04"E	83° 06'46"E	83° 06'21"E	83° 06'54"E	83° 02'28"E	83° 03'10"E	82° 54'47"E
LITHOLOGICAL NAME	GRANITE	GRANITE	SYENITE	GRANITE	GRANITE	GRANITE	GRANITE	SYENITE	GRANITE	GRANITE	GRANITE	SYENITE	SYENITE	GRANITE	MNZ
qz	22.12	4.25	9.94	25.73	25.05	19.66	33.19	3.72	27.06	26.39	24.17	8.90	16.30	26.24	4.55
or	31.09	40.07	34.87	30.26	29.55	29.08	26.12	33.69	31.32	30.79	31.26	32.86	35.58	29.43	18.38
ab	38.42	46.77	46.29	37.74	38.42	40.11	29.95	48.91	37.49	36.22	37.82	45.61	32.41	37.57	50.01
an	3.27	0.00	3.59	1.30	1.96	3.62	3.65	4.89	1.64	2.85	1.83	4.33	4.76	2.54	13.16
lc	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ne	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
kal	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C	0.00	0.00	0.00	0.45	0.00	0.00	0.84	0.00	0.01	0.10	0.41	0.00	0.74	0.01	0.00
di	0.00	0.99	1.03	0.00	0.75	2.58	0.00	2.33	0.00	0.00	0.00	0.91	0.00	0.00	0.60
hy	0.30	0.00	0.01	0.21	0.00	0.00	0.65	0.66	0.19	0.25	0.20	0.00	0.27	0.32	3.08
wo	0.00	2.19	0.00	0.00	0.04	0.14	0.00	0.00	0.00	0.00	0.00	0.34	0.00	0.00	0.00
ol	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ac	0.00	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
mt	0.00	6.87	4.45	0.85	1.36	5.31	0.20	4.70	0.93	2.41	0.70	5.63	0.00	0.00	11.35
il	0.36	0.68	0.42	0.38	0.46	0.70	0.27	1.16	0.49	0.47	0.40	0.70	0.36	0.30	1.88
hm	0.02	0.00	0.00	1.14	1.01	0.00	2.94	0.00	0.69	0.78	1.43	0.48	1.59	0.86	0.00
ti	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ap	0.12	0.10	0.09	0.08	0.09	0.28	0.15	0.49	0.10	0.08	0.07	0.10	0.09	0.08	0.44
ru	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.15	0.08	0.00
Total	95.77	102.02	100.69	98.14	98.69	101.48	97.96	100.55	99.92	100.34	98.29	99.86	92.25	97.43	103.45
mt+il+hm	0.38	7.55	4.87	2.37	2.83	6.01	3.41	5.86	2.11	3.66	2.53	6.81	1.95	1.16	13.23
Differenciation Index	95.7	89.3	90.5	95.5	94.3	87.6	91.1	85.8	95.9	93.1	94.9	87.5	91.4	95.7	70.5
(an/an+ab)X 100	7.8	0.0	7.2	3.3	4.9	8.3	10.9	9.1	4.2	7.3	4.6	8.7	12.8	6.3	20.8

Modal opaque minerals	0.4	0.7	0.3	0.5	0.7	1.0	0.5	1.5	0.7	1.0	0.5	0.5	0.5	0.3	3.0