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Petrographic Analyses of URL-2 and URL-6
Special Thermal Conductivity Samples

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Introduction

This report summarizes the petrography of 41 core samples of the Lac du Bonnet granite collected at 10m intervals from borehole URL-6, and 199 samples collected at 5m intervals from borehole URL-2. The samples were chosen for thermal diffusivity and conductivity measurements at ambient temperature (M.Drury, Earth Physics Branch), and the modal results will be used in modelling thermal properties of the rock mass.

Sample Descriptions

The colour of the core samples from both boreholes varies between shades of pink and grey. Unaltered samples are grey in colour, whereas pink hues are due to formation of iron oxides along grain boundaries and intragranular fractures as a result of hydrothermal alteration. In hand specimen the rocks are medium to coarse grained, inequigranular, and massive or with a weakly developed gneissosity or schistosity.

The upper 150m (downhole length) of both boreholes consists of pink granite and pegmatite with gneissic xenoliths and microliths (millimetre to metre scale) (tables 1 & 2). The lower portions of the boreholes consist primarily of grey granite.

In thin section the massive, non-pegmatitic samples have a hypidiomorphic-granular texture. Plagioclase feldspar grains are stubby prisms of oligoclase generally less than 5mm, with oscillatory zoning. Microcline prisms are less than about 15 x 8 mm in cross section, have characteristic grid twinning, and contain euhedral inclusions of oligoclase. Biotite, and muscovite with sphene, apatite, calcite, magnetite, and zircon commonly occur as sheafs between quartz and feldspar, and between adjacent feldspar grains.

The primary silicates have not been recrystallized although biotite is commonly replaced to varying degrees by chlorite, and plagioclase is dusted with dark-rimmed two-phase fluid inclusions, plus sericite, epidote, allanite, iron oxide, calcite, and chlorite. Two types of allanite are present as accessory minerals: A brown, anhedral to subhedral variety commonly occurs as metamict cores of epidote. A less abundant type is pale green to pale yellow, euhedral to subhedral, metamict, up to 1.5 mm in size, and rarely has narrow epidote rims.

Modal Compositions

Modal compositions were determined by a standard point counting procedure on either two 50x75 mm oversize thin sections, or four 21x46mm standard-size thin sections prepared from each core sample. On each set of thin sections, 2400 points were counted using a grid spacing of 1.0x 0.67mm, over a total measurement area of 1750 mm². The measurement area and grid spacing were chosen with consideration to the coarse grain size of the samples (Chayes 1956, Nuyens and Dence 1979).

URL-6

Most of the URL-6 samples (25) are monzogranite in composition; 11 samples are granodiorite, 3 are tonalite, 1 is quartz monzonite, and 1 is alkali-feldspar quartz syenite (Table 1 and Figure 1). Most of the compositional variation in the borehole occurs in the top 170m, which largely comprises altered lithologies. The zone of pink colouration extends down to approximately 270m, although there is a zone of grey rock between 220m and 250m.

Two gneissic inclusions were sampled: Sample 125 consists of medium grained pyroxene and hornblende with tonalitic aplite stringers and dikelets. Sample 145 is a foliated fine grained biotite-amphibolite, with granoblastic quartz and plagioclase grains.

These two samples plot in the tonalite field, practically on the Qtz-Pl join (Figure 1). The third tonalitic sample (sample 85) is a massive medium to coarse grained leucocratic rock with hypidiomorphic-granular texture.

Sample 95 has a monzogranite composition and an hypidiomorphic-granular texture, but contains a 15mm triangular-shaped sheaf of biotite and opaque. Sample 105 is a leucocratic pegmatite with monzogranite composition. Sample 135 is a pegmatite with grain size of 4-5cm, and composition of alkali-feldspar quartz syenite.

Although the diversity of compositions is greater for the altered (pink) samples (including pegmatites) than for the unaltered (grey) samples, it appears that the average compositions of the two do not differ significantly (Figures 2 and 3). The average composition of the altered samples appears to be slightly more potassic than the grey samples, but this is largely due to the sample which plots near the Kfs apex (sample 135).

URL-2

The dominant rock type in borehole URL-2 is again monzogranite (154 samples). The remaining samples are granodiorite (30), syenogranite (5), quartz-diorite (1), quartz-monzodiorite (2), quartz-syenite (1), quartz-rich granitoid (1), monzodiorite (1), diorite(1), tonalite (3), (Figure 4, grey unaltered samples; and Figure 5, all other samples). The quartz rich granitoid (sample 250) is a coarse grained (grain size = cm scale) pegmatite. The high measured quartz content is fortuitous, a result of the extremely coarse grain size in relation to the size of the sample, and therefore the mode does not represent the true composition of the rock.

The zone of pink colouration which was noted in the top 150m of borehole URL-6, extends down to approximately the 180m level in URL-2. The upper portion of the pink zone, as in URL-6, contains abundant K-poor gneissic inclusions and pegmatites. Below the zone of pink rock is grey granite with minor pegmatite, granodiorite, and syenogranite. In addition, biotite-quartz amphibolite, and metagabbro are encountered at 635m and 904m respectively.

The following are brief descriptions of the gneissic and pegmatitic samples encountered in URL-2:

- Sample 105 is a fine grained foliated K-poor quartz-monzodiorite gneiss with granoblastic quartz and plagioclase. Sample 110 has a similar texture, but has a tonalitic composition and contains cm-size quartz stringers with sutured grain boundaries.
- Sample 125 consists of a pink monzogranitic pegmatite vein with cm-size grains, and pink granite.
- Sample 130 is a coarse grained (5mm-1cm) leucocratic monzogranitic pegmatite with hypidiomorphic-granular texture.
- Sample 135 is a monzodiorite with a relict igneous texture. The edges of stubby prisms of plagioclase have been partially replaced by fine grained biotite flakes and biotite-quartz symplectite. Sample 145 has a similar texture but fewer plagioclase grain boundaries have been replaced by biotite, and is a quartz-diorite in composition.
- Sample 140 has a quartz-monzodiorite composition, and consists of pink pegmatite stringers, and mafic portions with relict granitic texture. The mafic portions consist of prismatic plagioclase with carlsbad twins, and interstitial biotite and quartz.
- Sample 165 is a pink coarse grained leucocratic quartz-syenitic pegmatite (grain size at least 25mm).
- Sample 625 has a monzogranitic composition, and consists of a small amount of medium-grained granite, and a 2cm wide pegmatite vein with an adjacent irregular-shaped biotite-rich mafic layer.
- Sample 635 is a fine grained equigranular amphibolite of tonalitic composition, with granoblastic plagioclase.
- Sample 904 is a metagabbro consisting of medium to coarse dark green poikilitic amphibole replacing pyroxene, interlayered with fine grained granoblastic plagioclase and quartz.

Collectively, the unaltered granitic samples (Figure 4) have 3-4 times smaller standard deviations (S) for quartz ($S=3.8\%$), plagioclase ($S=6.4\%$), and microcline ($S=7.2\%$), compared to the standard deviations for all other samples from URL-2 (pink granite, pegmatite, and gneissic samples, and metagabbro) (Figure 5). In the grey granite, S for quartz is about 50% smaller than S for either of the two feldspars.

Summary and Conclusions

The lithological variations in the Lac du Bonnet granite observed in boreholes URL-2 and URL-6 are similar to those in borehole WN-4: A mixed zone of pink granite which contains inclusions of older, slightly more mafic and less potassic rock with relict igneous textures, and pegmatite occur in the upper portions (150m) of the boreholes. A zone of pink and grey granite occurs below the upper mixed zone in WN-4 and URL-6, and is in turn underlain by relatively uniform unaltered grey granite.

The main rock type in boreholes URL-2 and URL-6 is monzogranite (61% of samples in URL-6 and 77% of samples in URL-2). Granodiorite is the next most abundant rock type (26% of samples in URL-6 and 15% of samples in URL-2).

There is no systematic variation in modal composition with depth.

The larger standard deviations (S) of the mode for the Lac du Bonnet granite at the URL site ($S_{\text{Quartz}}=3.9\%$, $S_{\text{Plagioclase}}=6.2\%$, $S_{\text{Microcline}}=7.2\%$) compared to those for the Eye-Dashwa Lakes pluton in the vicinity of borehole ATK-3 ($S_{\text{Quartz}}=2.53\%$, $S_{\text{Plagioclase}}=1.9\%$, $S_{\text{Microcline}}=2.2\%$) (Chernis and Nuyens 1982) indicate that the latter pluton is more homogeneous at a 5m sampling scale.

References

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- Nuyens, W. and M.R. Dence. 1979. Rock coarseness and precision of modal analysis of Whiteshell and Chalk River samples, Department of Energy, Mines, and Resources, Earth Physics Branch, Technical Data 303415 - M04/79.
- Streckeisen, A. 1976. To each plutonic rock its proper name. Earth-Science Reviews, 12, pp. 1-33.

Acknowledgments

Dr. P.B. Robertson (Earth Physics Branch) reviewed this manuscript.

Table 1. URL-6 Modal Analyses. Sample numbers are downhole length, to nearest metre.

Sample	Qtz	Pl	Kfs	Bt	Chl	Ms	Op	Ap	Spn	Ep	Aln	Cal	Total	Rock Type	Colour	
5	27.5	32.8	35.2	1.7	0.4	0.3	1.8	0.0	0.2	0.1	0.0	0.1	100.1	Monzogranite	Pink	
15	29.1	42.3	22.5	3.5	0.5	0.8	0.6	0.2	0.3	0.0	0.2	0.0	100.0	Granodiorite	Pink	
25	27.2	41.2	24.8	4.5	0.3	1.0	0.5	0.1	0.2	0.1	0.1	0.0	100.0	Monzogranite	Pink	
35	30.8	37.5	26.8	3.9	0.1	0.4	0.3	0.1	0.1	0.1	0.0	0.0	100.1	Monzogranite	Pink	
45	30.7	42.9	21.5	3.8	0.3	0.3	0.1	0.0	0.1	0.1	0.0	0.0	99.8	Granodiorite	Pink	
55	25.3	50.3	14.8	8.0	0.3	0.5	0.3	0.1	0.3	0.1	0.0	0.0	100.0	Granodiorite	Pink	
65	7.5	34.7	53.4	2.1	0.6	0.4	0.9	0.0	0.0	0.1	0.2	0.0	99.9	Qtz- monzonite	Pink	
75	23.9	53.0	17.1	4.0	0.3	0.8	0.3	0.0	0.1	0.1	0.1	0.2	99.9	Granodiorite	Pink	
85	40.4	58.8	0.4	0.1	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	99.9	Tonalite	Pink	
95	24.8	27.7	36.1	9.2	0.4	0.5	0.7	0.2	0.2	0.1	0.2	0.0	100.1	Monzogranite	Pink	
105	26.5	36.8	33.7	2.0	0.3	0.3	0.3	0.1	0.0	0.0	0.0	0.0	100.0	Monzogranite	Pink Pegmatite	
115	33.0	23.9	39.6	2.5	0.5	0.0	0.1	0.0	0.1	0.0	0.2	0.0	99.9	Monzogranite	Pink	
125	16.8	20.5	0.0	0.0	0.0	61.6*	0.0	0.0	0.0	0.9	0.0	0.2	100.0	Tonalite	Black w/white	
#approx. 50% Cpx, 12% Hbl																
135	6.3	4.8	88.8	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	100.0	Kfs-Qtz Syenite	Pink pegmatite	
145	19.5	29.2	0.0	8.7	0.0	27*	14.3	0.1	0.0	1.0	0.0	0.0	99.8	Tonalite	Black & grey	
*Hbl																
156	38.7	43.9	11.8	4.1	0.3	0.7	0.3	0.1	0.0	0.0	0.1	0.0	100.0	Granodiorite	Pink	
165	30.5	24.7	43.1	1.0	0.3	0.3	0.0	0.0	0.1	0.1	0.0	0.0	100.1	Monzogranite	Pink	
175	29.3	33.0	32.9	3.2	0.4	0.5	0.3	0.2	0.0	0.1	0.1	0.1	100.1	Monzogranite	Pink	
185	27.2	37.1	30.8	2.7	0.3	0.7	0.9	0.0	0.1	0.2	0.1	0.0	100.1	Monzogranite	Pink	
195	27.2	38.6	28.1	4.5	0.5	0.9	0.2	0.1	0.0	0.0	0.0	0.0	100.1	Monzogranite	Pink	
205	23.1	45.6	26.8	2.7	0.4	0.9	.0	0.1	0.1	0.1	0.1	0.1	0.0	100.0	Monzogranite	Pink
215	39.0	37.4	17.3	4.0	0.5	0.9	0.2	0.1	0.4	.0	0.3	.0	100.0	Granodiorite	Pink	
225	26.8	40.0	28.4	3.0	0.1	1.3	0.2	0.0	0.1	0.1	0.0	0.0	100.0	Monzogranite	Grey	
235	24.2	36.2	33.1	3.9	0.4	0.7	1.1	0.2	0.0	0.2	0.0	0.0	100.0	Monzogranite	Grey	
245	27.8	42.8	24.4	3.8	0.3	0.4	0.3	0.2	0.0	0.0	0.0	0.0	100.0	Monzogranite	Grey	
255	28.8	32.2	36.8	1.2	0.1	0.6	0.3	0.0	0.0	0.0	0.0	0.0	100.0	Monzogranite	Pink pegmatite	
265	25.5	34.2	35.8	3.1	0.2	0.5	0.3	0.0	0.1	0.1	0.1	0.1	100.0	Monzogranite	Pink	
275	28.0	35.5	30.8	3.8	0.3	0.9	0.3	0.0	0.3	0.1	0.0	0.0	100.0	Monzogranite	Pink	
285	30.0	46.6	17.3	3.2	0.7	1.3	0.0	0.2	0.1	0.1	0.2	0.3	100.0	Granodiorite	Grey	
295	30.8	36.0	28.2	2.7	0.3	1.0	0.5	0.1	.0	0.1	0.1	0.0	100.0	Monzogranite	Grey	
305	26.7	39.4	30.5	2.1	0.4	0.5	0.3	0.0	.0	0.1	0.0	.0	100.0	Monzogranite	Grey	
315	25.6	39.7	22.5	6.9	0.8	1.9	1.0	0.2	0.6	0.5	0.3	0.0	100.0	Monzogranite	Grey	
325	25.9	36.2	27.1	8.3	0.3	0.9	0.7	0.2	0.3	0.0	0.1	0.0	100.0	Monzogranite	Grey	
335	30.2	43.6	20.3	4.4	0.5	0.3	0.1	0.1	.0	0.3	0.1	.0	100.0	Granodiorite	Grey	
345	25.3	39.6	25.6	6.8	0.5	0.7	0.6	0.1	0.5	0.1	0.3	0.0	100.0	Monzogranite	Grey	
355	26.2	47.9	19.8	3.9	0.4	1.2	0.3	0.2	0.2	0.0	0.1	0.0	100.0	Granodiorite	Grey	
365	28.5	38.9	25.5	5.3	0.4	0.8	0.4	0.1	0.0	.0	0.1	.0	100.0	Monzogranite	Grey	
375	29.2	40.7	25.1	3.2	0.3	1.1	0.1	0.1	.0	0.2	.0	0.0	100.0	Monzogranite	Grey	
385	24.7	37.4	29.0	6.8	0.3	0.3	0.8	0.2	0.3	0.0	0.3	0.0	100.0	Monzogranite	Grey	
395	28.6	43.3	22.4	4.4	0.3	0.6	.0	.0	0.1	0.1	0.0	0.0	100.0	Granodiorite	Grey	
400	27.7	43.8	19.5	5.3	0.3	0.6	2.0	0.3	0.2	.0	0.3	0.0	100.0	Granodiorite	Grey	

Mineral Abbreviations: Qtz=quartz, Pl=plagioclase, Kfs=microcline, Bt=biotite, Chl=chlorite, Ms=muscovite, Op=opaque, Ap=apatite, Spn=spheene, Ep=Epidote, Aln=allanite, Cal=calcite, Hbl=hornblende, Px=pyroxene.

Table 2. URL-2 Modal Analyses. Sample numbers=downhole length (nearest metre). See table 1 for abbreviations.

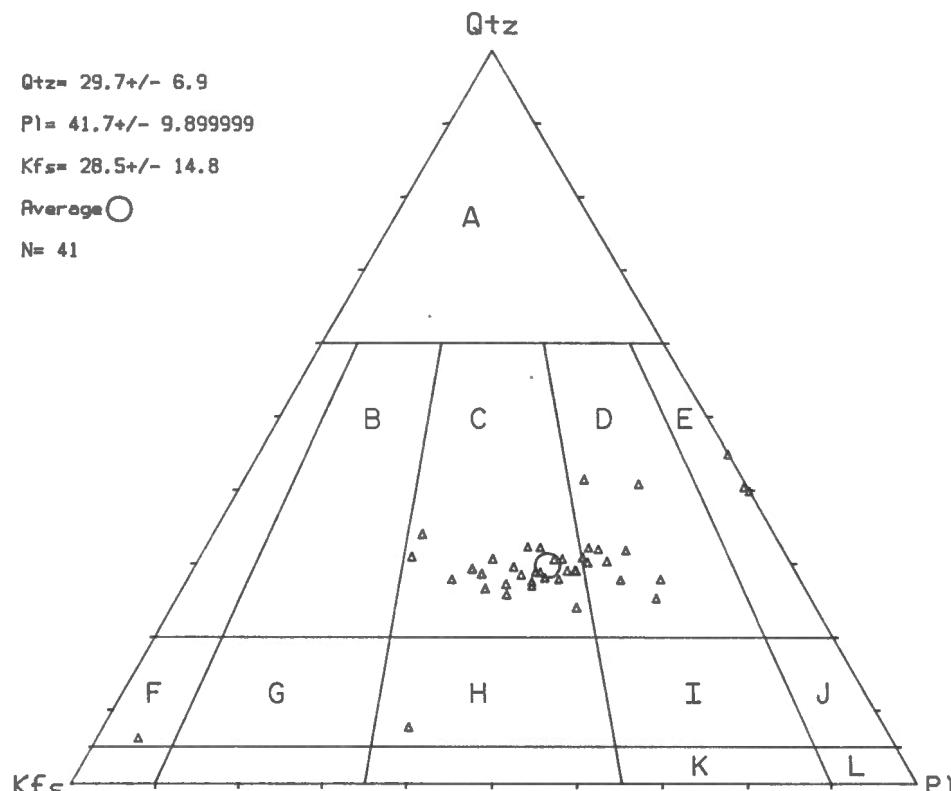
Sample	Qtz	Pl	Kfs	Bt	Chl	Ms	Op	Ap	Spn	Ep	Aln	Cal	Total	Rock Name	Notes
75	28.4	43.2	22.0	4.3	0.5	0.5	0.5	0.2	0.2	0.3	0.1	0.0	100.0	granodiorite	pink
100	29.8	30.4	35.7	2.8	0.4	0.3	0.5	0.0	0.1	.0	0.1	0.0	100.1	monzogranite	pink
105	14.9	54.8	6.6	19.6*	0.3	0.1	0.7	0.3	0.2	2.3	0.0	0.2	100.0	qtz-monzodiorite (*incl. 1.5% Hbl)	black&pink-grey
110	31.4	41.3	0.2	3.8	0.0	21.6*	.0	0.0	0.0	1.6	0.0	0.1	100.0	tonalite (*=blue-green Amp) (Amphibolite)	black
115	30.5	38.1	26.6	3.5	0.3	0.5	0.4	0.0	0.0	0.0	0.0	0.0	99.9	monzogranite	pink
120	30.0	40.0	24.7	4.5	0.1	0.0	.0	0.1	0.1	0.2	0.4	0.0	100.0	monzogranite	pink
125	31.9	38.8	24.7	3.5	0.2	0.3	0.2	0.0	0.0	0.4	0.0	0.0	100.0	monzogranite	pink pegmatite w/mafic lenses
130	31.5	33.3	31.9	2.5	0.3	0.0	0.1	0.2	0.0	0.1	0.0	0.0	99.9	monzogranite	pink
135	0.2	45.4	6.0	45.4	0.2	0.0	0.3	0.7	1.5	0.0	0.4	0.0	100.1	monzodiorite	black&pink
140	11.0	52.8	8.8	21.3	0.2	0.0	0.1	0.4	0.6	1.7	0.3	2.8*	100.0	qtz-monzodiorite *=Hbl	Pegmatite w/ mafic inclusion
145	13.5	66.4	5.7	12.3	0.4	0.0	0.7	0.4	0.4	0.3	.0	0.0	100.1	qtz-diorite	pink&black
150	26.4	43.2	24.1	4.1	0.4	0.3	0.7	0.0	0.3	0.4	0.0	0.0	99.9	monzogranite	pink
155	29.0	41.2	24.2	4.3	0.3	0.4	0.3	.0	0.1	.0	.0	.0	100.0	monzogranite	pink
160	28.7	44.0	10.5	15.4	0.1	.0	0.2	0.5	0.5	0.0	0.1	0.0	100.1	granodiorite	w/mafic inclusions
165	6.1	18.5	71.1	0.4	3.4	0.1	.0	.0	0.1	0.1	0.0	.0	100.0	qtz-syenite	pink, cgr
170	27.9	34.5	34.2	2.4	0.4	0.5	0.0	.0	.0	.0	.0	.0	100.0	monzogranite	pink
175	31.1	44.0	19.8	4.4	0.0	0.2	0.1	0.1	0.0	0.1	0.0	.0	99.9	granodiorite	grey-pink
180	27.9	37.2	29.5	3.4	0.4	0.6	0.4	0.1	0.3	0.3	0.1	0.1	100.0	monzogranite	pink & dark grey
185	32.0	34.5	29.4	2.6	0.4	0.5	0.2	0.1	0.1	0.2	0.0	0.0	100.0	monzogranite	grey coarse grained
195	35.5	45.9	12.5	4.5	0.2	0.8	0.2	0.0	0.1	0.1	0.1	0.1	100.0	granodiorite	grey
200	31.5	38.7	26.6	2.0	0.3	0.5	0.0	0.1	0.1	0.1	0.3	0.0	100.1	monzogranite	grey
205	27.5	50.7	6.6	13.6	0.2	0.0	0.6	0.2	0.3	0.1	0.1	0.0	99.9	granodiorite	grey
210	36.1	38.5	24.5	0.5	0.1	0.1	.0	0.0	0.0	0.0	.0	0.0	99.9	monzogranite	grey,W/yellow, mgr.
215	21.0	29.8	46.1	1.5	0.9	0.4	0.0	0.0	0.0	0.3	.0	.0	100.0	monzogranite	grey
220	30.2	40.7	25.4	2.1	0.5	0.7	0.1	0.1	.0	.0	0.1	.0	100.0	monzogranite	grey w/yellow inhomogeneous
225	34.2	38.3	23.3	3.2	0.3	0.5	0.2	.0	0.0	0.1	0.0	.0	100.0	monzogranite	grey
230	31.0	41.1	23.8	2.6	0.2	0.8	0.1	0.1	0.0	0.1	0.0	0.1	99.9	monzogranite	grey
235	39.7	48.8	9.5	0.1	0.0	0.3	1.5	0.0	0.0	0.0	0.0	0.1	100.0	granodiorite	white w/pink, cgr.
240	31.7	37.8	26.0	2.5	0.4	1.1	0.4	.0	0.0	0.0	.0	.0	100.0	monzogranite	grey
245	24.8	36.8	34.0	1.9	0.3	0.6	1.5	0.0	0.0	0.1	0.0	.0	100.0	monzogranite	grey
250	81.3	3.6	14.8	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	99.9	Qtz-rich granitoid	white-pink,fgr-cgr.
255	29.2	39.2	25.5	3.9	0.3	1.0	0.3	0.1	0.1	0.2	0.1	0.1	100.0	monzogranite	grey
260	30.9	40.3	23.0	3.4	0.4	1.5	0.3	0.1	0.0	.0	.0	.0	100.0	monzogranite	grey w/green
265	29.5	34.8	29.9	3.4	0.3	1.0	0.7	0.1	0.0	0.2	.0	0.0	99.9	monzogranite	grey
270	30.8	43.9	19.3	3.5	0.3	1.3	0.5	0.1	0.0	.0	.0	0.1	99.9	granodiorite	grey
275	25.9	40.3	28.1	4.1	0.3	0.8	0.1	0.1	.0	0.0	0.1	.0	100.0	monzogranite	grey
280	31.7	32.9	31.7	1.5	0.4	1.5	.0	.0	0.0	0.2	0.0	.0	100.0	monzogranite	grey
285	29.5	42.7	22.0	3.5	0.5	1.3	0.3	0.1	0.0	.0	.0	0.0	100.0	granodiorite	grey,inhomogeneous
290	33.8	36.2	26.2	2.1	0.2	0.8	0.4	0.1	0.0	0.1	0.1	0.0	100.0	monzogranite	grey
295	41.0	34.0	22.1	0.1	0.2	0.7	1.5	0.0	0.0	0.2	0.1	0.1	100.0	monzogranite	grey
300	41.1	48.2	7.0	2.0	0.5	0.9	0.3	0.0	0.0	0.0	0.0	0.1	100.1	granodiorite	grey inhomogeneous
305	32.5	48.0	17.3	0.6	0.2	0.7	0.5	0.0	.0	.0	0.0	0.1	100.0	granodiorite	white-grey
310	28.2	46.6	19.0	4.5	0.3	0.8	0.2	.0	0.0	0.2	0.1	0.0	100.0	granodiorite	grey
315	33.8	38.6	23.0	3.0	0.5	0.9	0.0	0.0	0.0	0.0	0.1	0.1	100.0	monzogranite	grey
320	26.9	36.1	32.6	2.4	0.5	1.1	0.1	0.1	0.0	0.0	0.2	0.1	100.1	monzogranite	grey w/cgr veinlet
325	29.8	41.8	24.5	2.6	0.5	0.4	0.3	.0	.0	.0	0.0	0.1	100.0	monzogranite	grey w/yellow
330	28.6	39.6	27.5	2.6	0.3	0.8	0.3	0.2	0.0	0.1	0.0	0.1	100.1	monzogranite	grey
335	26.9	39.4	27.8	3.8	0.4	1.1	0.3	0.0	0.0	0.1	.0	.0	99.9	monzogranite	grey
340	27.8	38.0	30.0	2.7	0.3	0.8	0.3	0.0	0.0	0.1	0.0	0.0	100.0	monzogranite	grey, mgr.

Sample	Qtz	Pl	Kfs	Bt	Chl	Ms	Op	Ap	Spn	Ep	Aln	Cal	Total	Rock	Name	Notes
345	29.1	44.2	22.3	2.8	0.3	0.7	0.3	0.1	0.0	0.1	0.0	0.1	100.0	monzogranite	grey inequigranular	
350	33.4	39.0	23.0	2.4	0.6	0.8	0.5	0.0	0.0	0.1	0.2	0.0	100.0	monzogranite	grey	
355	35.9	21.5	40.3	0.9	0.5	0.8	0.1	0.0	0.0	0.0	0.0	0.1	100.1	syenogranite	white to grey	
360	29.5	51.3	11.7	5.9	0.1	1.0	0.3	0.1	0.0	0.0	0.1	0.1	100.0	monzogranite	grey	
365	31.5	35.4	29.9	1.6	0.3	0.9	0.3	.0	.0	0.0	0.0	0.1	100.0	monzogranite	white-grey	
370	39.8	34.0	23.5	0.3	0.3	0.6	1.3	0.0	0.0	0.1	.0	0.1	100.0	monzogranite	grey	
375	35.4	27.3	35.6	0.5	0.1	0.5	0.6	0.0	0.0	0.0	0.0	0.0	100.0	monzogranite	grey w/yellow	
380	28.0	25.6	43.1	1.6	0.8	0.4	0.4	0.0	0.0	0.1	0.0	0.0	100.0	monzogranite	white	
385	37.0	25.3	35.4	0.8	0.2	0.3	0.5	0.1	0.0	0.1	0.3	0.0	100.0	monzogranite	white to grey	
390	49.0	28.5	19.3	0.6	0.4	0.8	1.1	0.0	0.0	0.2	0.1	0.0	100.0	monzogranite	grey	
395	39.5	20.0	39.1	0.3	0.0	0.3	0.7	0.0	0.0	0.0	0.0	0.0	99.9	syenogranite	white to grey	
400	36.6	17.5	43.3	0.3	0.7	0.6	0.8	0.0	0.1	0.0	0.0	0.0	99.9	monzogranite	white to grey	
405	32.2	32.4	33.1	0.3	0.2	0.8	0.8	.0	.0	0.1	0.0	.0	100.0	monzogranite	white to grey	
410	40.5	38.3	19.3	1.0	0.0	0.6	0.2	0.0	0.0	0.0	0.0	0.0	99.9	monzogranite	white to grey	
415	32.7	25.0	39.9	0.3	0.4	0.7	0.8	0.0	0.0	0.0	.0	.0	100.0	monzogranite	white	
420	29.9	39.1	28.4	1.7	0.2	0.5	0.2	0.0	0.0	0.0	0.0	0.0	100.0	monzogranite	grey	
425	40.5	25.7	31.6	0.8	0.2	0.4	0.6	0.0	0.1	.0	.0	.0	100.0	monzogranite	grey, Spn channel=Zr	
430	29.1	42.6	21.7	5.6	0.3	0.3	0.3	0.0	0.0	0.0	0.0	0.0	99.9	monzogranite	grey	
435	29.6	39.0	25.3	5.0	0.3	0.4	0.3	0.0	0.0	0.0	0.0	0.0	99.9	monzogranite	grey	
440	29.3	38.6	25.3	5.3	0.2	0.5	0.6	0.0	0.0	0.0	0.1	0.0	99.9	monzogranite	grey	
445	29.5	42.4	20.5	6.2	0.2	0.3	0.4	0.2	.0	0.1	0.1	.0	100.0	monzogranite	grey	
450	28.3	38.7	26.0	5.7	0.1	0.3	0.5	0.2	0.0	0.0	0.1	0.1	100.1	monzogranite	grey inhomogeneous	
455	26.5	41.1	26.4	4.7	0.2	0.5	0.4	0.1	0.0	0.0	0.0	0.0	99.9	monzogranite	grey	
460	31.0	43.4	19.9	4.7	0.1	0.3	0.3	.0	0.1	0.0	0.1	.0	100.0	monzogranite	grey	
465	26.3	41.7	25.9	4.4	0.4	0.7	0.5	0.1	0.0	0.1	.0	0.0	99.9	monzogranite	grey	
470	27.1	40.4	26.4	4.3	0.4	0.5	0.5	0.0	0.1	0.2	0.1	0.0	100.0	monzogranite	grey	
475	30.5	40.9	22.5	4.8	0.5	0.1	0.3	.0	.0	0.0	0.1	0.1	100.0	monzogranite	grey	
480	28.3	41.5	23.5	5.7	0.0	0.1	0.4	0.2	0.0	0.2	0.2	0.0	100.1	monzogranite	grey, foliated	
485	29.1	40.3	24.2	4.8	0.4	0.5	0.3	0.1	.0	.0	0.2	.0	100.0	monzogranite	grey&weak pink	
490	30.1	41.9	23.5	3.3	0.3	0.5	0.4	0.1	0.0	0.0	.0	.0	100.0	monzogranite	grey	
495	31.1	48.3	12.5	6.5	0.3	0.7	0.3	0.1	0.0	0.2	0.1	0.0	100.1	monzogranite	dark grey	
500	30.7	40.0	23.3	4.6	0.2	0.4	0.5	0.1	0.0	0.0	0.4	0.0	100.1	monzogranite	grey, foliated	
505	30.8	42.2	22.9	3.1	0.4	0.3	0.3	.0	.0	0.0	0.2	0.0	100.1	monzogranite	grey	
510	34.5	36.3	26.0	2.2	0.2	0.4	0.2	0.0	0.0	0.1	0.0	0.0	100.0	monzogranite	grey	
515	32.2	46.2	16.3	4.3	0.1	0.4	0.3	.0	0.0	0.1	.0	0.1	100.0	monzogranite	grey	
520	27.3	44.8	21.8	4.8	0.4	0.3	0.3	.0	.0	0.2	.0	.0	100.0	monzogranite	grey	
525	29.2	35.3	31.2	2.3	0.6	0.4	0.9	0.0	0.0	0.0	0.0	0.0	99.9	monzogranite	grey	
530	30.2	38.8	25.9	3.4	0.3	0.7	0.5	0.1	0.0	0.0	0.0	0.0	99.9	monzogranite	grey	
535	27.2	37.6	31.5	2.6	0.3	0.1	0.4	0.1	.0	.0	0.0	.0	100.0	monzogranite	grey	
540	31.8	38.3	26.0	2.6	0.1	0.4	0.4	0.2	0.0	0.0	0.1	0.0	99.9	monzogranite	grey w/yellow	
545	26.7	43.6	25.5	3.0	0.2	0.5	0.5	.0	0.0	.0	0.0	.0	100.0	monzogranite	grey	
549	29.1	32.6	34.6	3.2	0.1	0.2	0.1	0.0	0.0	.0	0.0	0.1	100.0	monzogranite	grey	
554	28.0	32.2	32.7	6.3	0.1	0.1	0.3	0.1	0.0	0.0	0.1	.0	100.0	monzogranite	grey w/mafic clot	
563	29.0	40.4	25.8	3.7	0.2	0.7	0.2	0.0	.0	0.0	0.0	0.1	100.0	monzogranite	grey	
565	27.0	39.7	28.0	4.4	0.0	0.5	0.3	0.1	0.0	0.0	0.1	0.0	100.1	monzogranite	grey w/yellow&pink	
570	28.1	38.3	27.7	5.0	0.1	0.3	0.4	0.0	0.0	0.0	.0	0.0	100.0	monzogranite	grey	
575	30.4	32.1	35.6	1.3	0.1	0.3	0.1	.0	0.0	0.0	0.0	0.1	100.0	monzogranite	white w/faint pink, inhomogeneous	
580	29.6	38.2	28.7	2.7	0.2	0.1	0.3	.0	0.0	.0	0.1	.0	100.0	monzogranite	grey	
585	31.5	35.8	29.6	2.2	0.4	0.3	0.2	0.0	0.0	0.0	0.0	0.0	100.0	monzogranite	grey	
590	29.5	36.1	30.5	2.7	0.3	0.5	0.3	0.0	0.0	.0	0.1	0.1	100.0	monzogranite	grey	
595	29.8	35.7	29.7	4.0	0.1	0.3	0.2	0.0	0.1	0.0	0.1	0.0	100.0	monzogranite	grey	
599	33.2	34.9	26.2	3.8	0.3	0.5	0.8	0.3	0.0	.0	0.0	0.0	100.0	monzogranite	grey	
605	32.5	25.6	37.7	2.1	0.4	0.8	0.8	0.1	0.0	0.0	0.2	0.0	100.0	monzogranite	white to grey	
611	33.4	31.0	31.8	2.3	0.1	0.9	0.4	0.0	0.0	0.0	0.0	0.0	99.9	monzogranite	grey	
615	31.1	36.5	27.6	2.8	0.3	0.5	1.0	0.0	.0	0.0	0.1	0.1	100.0	monzogranite	grey	
625	26.2	38.4	21.0	10.5	0.3	0.5	2.1	0.3	0.0	0.0	0.8	.0	100.0	monzogranite	grey	

Sample	Btz	P1	Kfs	Bt	Chl	Ms	Op	Ap	Spn	Ep	Aln	Cal	Total	Rock	Name	Notes
630	35.7	46.4	15.5	1.6	0.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0	100.0	monzogranite	grey	
635	17.6	57.4	0.0	12.6	0.0	12.0*	0.0	0.0	0.2	0.2	0.0	0.0	100.0	amphibolite/tonalite	grey, fgr *=Hbl	
640	39.7	40.8	16.0	2.5	0.3	0.4	0.0	0.0	0.0	0.0	0.1	0.2	100.0	monzogranite	grey	
645	28.9	38.6	29.0	2.7	0.3	0.4	0.0	0.0	0.0	0.0	0.0	0.0	99.9	monzogranite	grey	
650	33.6	33.5	31.9	0.3	0.1	0.2	0.3	0.0	0.0	0.0	0.0	0.0	100.0	monzogranite	white w/diffuse pink, mgr	
655	32.7	54.0	8.8	3.4	0.1	0.1	0.7	0.0	0.0	0.0	0.1	0.1	100.0	monzogranite	grey, inhomogeneous	
660	30.1	41.9	23.4	2.9	0.7	0.6	0.3	0.1	0.0	0.0	0.0	0.0	100.0	monzogranite	grey	
665	26.4	34.8	35.5	2.1	0.3	0.3	0.5	0.0	0.0	0.0	0.0	0.0	99.9	monzogranite	grey	
670	29.9	10.6	58.7	0.3	0.3	0.2	0.0	0.0	0.0	0.0	0.0	0.0	100.0	syenogranite	V. pale pink, fgr, sugary	
675	32.0	36.7	26.4	3.8	0.0	0.4	0.5	0.0	0.0	0.0	0.2	0.1	100.1	monzogranite	grey, inhomogeneous	
680	30.0	36.8	28.7	3.0	0.2	0.5	0.7	0.1	0.0	0.0	0.0	0.1	100.1	monzogranite	grey	
685	23.4	36.6	33.8	3.5	0.8	0.3	1.5	0.1	0.0	0.0	0.0	0.0	100.0	monzogranite	grey	
690	36.0	39.2	21.3	2.4	0.3	0.4	0.3	0.0	0.0	0.0	0.0	0.0	100.0	monzogranite	grey, inhomogeneous	
695	28.2	40.7	27.4	2.9	0.0	0.3	0.4	0.1	0.0	0.0	0.0	0.0	100.0	monzogranite	grey	
700	28.6	41.3	25.6	2.7	0.3	0.7	0.6	0.1	0.0	0.0	0.0	0.0	100.0	monzogranite	grey w/yellow	
705	30.8	41.9	23.7	2.4	0.2	0.5	0.4	0.2	0.0	0.0	0.1	0.0	100.0	monzogranite	grey	
710	30.3	37.0	27.1	3.3	0.4	1.3	0.3	0.1	0.0	0.0	0.1	0.1	100.0	monzogranite	grey	
715	31.8	36.7	26.4	3.9	0.3	0.3	0.5	0.2	0.0	0.0	0.1	0.0	100.0	monzogranite	grey	
720	27.4	36.0	29.7	5.6	0.3	0.4	0.5	0.1	0.0	0.0	0.0	0.0	100.0	monzogranite	grey	
725	27.0	34.6	32.3	4.9	0.2	0.1	0.5	0.1	0.0	0.0	0.4	0.0	100.1	monzogranite	grey	
730	20.7	35.0	37.7	5.0	0.0	0.3	0.7	0.2	0.0	0.0	0.3	0.2	100.1	monzogranite	grey	
735	29.3	37.3	27.5	5.0	0.1	0.2	0.7	0.0	0.0	0.0	0.0	0.0	100.1	monzogranite	grey	
740	26.6	14.6	52.3	4.6	0.8	0.4	0.8	0.0	0.0	0.0	0.0	0.0	100.0	syenogranite	grey	
745	31.3	32.8	31.8	3.2	0.2	0.5	0.2	0.0	0.0	0.0	0.0	0.1	100.1	monzogranite	grey w/yellow&pink	
750	29.2	32.2	31.1	6.4	0.0	0.3	0.4	0.2	0.0	0.0	0.1	0.1	100.0	monzogranite	grey	
755	34.3	37.3	23.3	4.3	0.2	0.3	0.1	0.1	0.0	0.0	0.0	0.0	99.9	monzogranite	dark grey w/slight pink colouration	
760	30.9	37.4	29.1	1.6	0.2	0.3	0.3	0.1	0.0	0.0	0.0	0.0	99.9	monzogranite	grey	
765	25.1	33.3	35.5	4.9	0.0	0.5	0.5	0.1	0.0	0.0	0.1	0.0	100.0	monzogranite	grey	
770	28.6	36.5	29.5	4.1	0.3	0.3	0.4	0.0	0.0	0.0	0.2	0.0	100.0	monzogranite	grey	
775	30.7	33.2	32.6	2.8	0.1	0.3	0.2	0.1	0.0	0.0	0.0	0.0	100.1	monzogranite	grey w/slight yellow tinge	
780	29.8	34.9	31.3	3.1	0.3	0.2	0.3	0.0	0.0	0.0	0.0	0.0	99.9	monzogranite	grey	
785	29.0	38.0	27.8	4.0	0.2	0.2	0.8	0.0	0.0	0.0	0.0	0.1	100.0	monzogranite	grey	
790	19.5	29.0	49.0	1.0	0.2	0.6	0.2	0.0	0.0	0.0	0.1	0.3	100.0	monzogranite	pink-grey, mgr	
795	29.5	37.1	28.0	4.0	0.3	0.4	0.5	0.0	0.0	0.0	0.1	0.0	100.0	monzogranite	grey, inhomogeneous	
800	30.4	38.2	25.1	5.5	0.3	0.1	0.3	0.1	0.0	0.0	0.0	0.0	100.0	monzogranite	grey	
805	30.7	30.0	36.4	2.2	0.3	0.3	0.2	0.0	0.0	0.0	0.0	0.0	100.0	monzogranite	grey,w/stress relaxation cracks	
810	30.3	38.2	26.1	3.7	0.3	0.5	0.5	0.1	0.0	0.0	0.3	0.1	99.9	monzogranite	grey	
815	30.2	39.7	25.9	3.1	0.3	0.3	0.3	0.1	0.0	0.0	0.1	0.0	100.0	monzogranite	grey	
820	33.5	40.0	23.3	2.3	0.3	0.2	0.3	0.0	0.0	0.0	0.1	0.0	100.0	monzogranite	grey	
825	30.8	37.1	28.0	3.3	0.2	0.2	0.4	0.1	0.0	0.0	0.0	0.0	100.1	monzogranite	grey	
830	28.6	38.9	27.7	3.6	0.3	0.4	0.2	0.1	0.0	0.0	0.2	0.0	100.0	monzogranite	grey,cgr,inhomogenous	
835	32.8	36.7	27.0	2.5	0.3	0.4	0.3	0.0	0.0	0.0	0.1	0.0	100.1	monzogranite	grey	
840	35.8	39.5	20.2	3.2	0.3	0.4	0.3	0.0	0.0	0.0	0.2	0.0	100.0	monzogranite	grey	
845	27.6	35.0	35.6	1.2	0.3	0.3	0.3	0.0	0.0	0.0	0.0	0.0	100.2	monzogranite	grey	
850	32.5	36.5	26.6	3.8	0.2	0.1	0.2	0.0	0.0	0.1	0.1	0.0	100.0	monzogranite	grey	
855	29.1	36.5	30.6	2.7	0.4	0.3	0.2	0.0	0.0	0.1	0.0	0.0	100.0	monzogranite	grey	
860	29.0	33.0	33.0	3.7	0.2	0.1	0.6	0.2	0.1	0.1	0.1	0.0	100.0	monzogranite	grey	
865	29.1	39.3	26.5	3.8	0.3	0.5	0.3	0.1	0.0	0.0	0.0	0.1	100.0	monzogranite	grey	
870	24.3	44.9	25.3	4.2	0.1	0.7	0.3	0.2	0.0	0.0	0.0	0.0	100.0	monzogranite	grey,w/stress relaxation cracks	
875	29.0	36.8	29.4	4.0	0.2	0.5	0.0	0.1	0.0	0.0	0.1	0.0	100.0	monzogranite	grey	

Sample	Qtz	Pl	Kfs	Bt	Chl	Ms	Dp	Ap	Spn	Ep	Aln	Cal	Total	Rock	Name	Notes
880	35.0	34.6	26.3	2.9	0.3	0.4	0.3	0.0	.0	0.0	0.1	0.0	100.0	monzogranite	pink-grey, inequigran	
															stress cracks	
885	30.7	36.8	28.0	3.7	0.2	0.3	0.1	0.0	0.0	0.0	0.2	0.0	100.0	monzogranite	grey	
890	34.3	35.3	26.9	3.0	0.3	0.2	.0	0.1	0.0	0.0	0.0	0.0	100.0	monzogranite	grey, inhomogeneous	
															inequigran.	
895	27.0	24.5	44.4	2.8	0.1	0.4	0.4	0.3	0.0	0.0	0.2	.0	100.0	monzogranite	grey, Cgr,	
															Inequigranular	
900	32.0	34.4	29.4	2.7	0.2	0.2	1.2	.0	.0	0.0	0.0	0.0	100.0	monzogranite	white, Sugary, Foliated	
904	2.3	45.8	0.3	31.5	0.0	18.5	0.0	0.8	0.8	.0	0.0	0.1	100.0	Gabbro/diorite	green #=Hbl, *=Cpx	
910	33.5	41.7	24.3	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	100.0	monzogranite	grey	
915	30.3	40.5	15.4	12.6	0.1	0.0	0.5	0.3	0.1	0.0	0.2	0.0	100.0	granddiorite	grey	
920	33.0	41.3	22.0	3.3	.0	0.1	0.1	.0	0.0	0.0	.0	.0	99.9	granddiorite	grey	
925	42.5	47.8	4.3	4.7	.0	0.1	0.3	0.0	0.0	0.2	0.0	0.0	100.0	tonalite	grey	
930	32.5	35.8	26.7	3.6	0.2	0.4	0.8	0.0	.0	0.0	0.1	0.0	100.0	monzogranite	grey	
935	31.3	37.4	26.7	3.7	0.1	0.3	0.5	0.1	0.1	0.0	0.0	0.0	100.0	monzogranite	grey w/ faint pink patches	
940	30.2	32.7	29.5	6.4	0.0	0.5	0.6	0.0	0.0	0.0	0.0	0.0	99.9	monzogranite	grey	
945	28.3	35.7	30.0	5.3	0.0	0.4	0.3	0.1	0.0	0.0	0.0	0.0	99.9	monzogranite	grey	
950	28.3	38.6	26.3	4.5	0.5	0.5	1.0	0.2	0.0	0.0	.0	0.1	100.0	monzogranite	grey	
955	32.0	34.9	29.0	3.0	0.2	0.4	0.5	.0	0.0	0.0	0.0	0.0	100.0	monzogranite	grey	
960	29.8	38.5	27.3	3.2	0.2	0.5	0.3	0.1	0.0	0.1	.0	.0	100.0	monzogranite	grey	
965	31.3	35.9	27.6	3.9	0.1	0.2	0.8	0.1	0.0	0.0	0.0	0.0	100.0	monzogranite	grey	
970	29.3	35.2	30.5	4.0	0.3	0.3	0.3	0.2	0.0	0.0	0.0	0.0	100.0	monzogranite	grey	
975	26.3	36.2	30.3	5.5	0.2	0.2	0.8	0.2	0.0	0.2	0.2	.0	100.0	monzogranite	grey w/fresh stress relaxation cracks	
980	25.5	41.5	26.0	5.9	0.2	0.3	0.4	.0	0.0	0.0	0.1	.0	100.0	monzogranite	grey	
985	27.2	37.3	29.5	4.8	0.2	0.5	0.4	0.2	0.0	0.0	0.0	0.0	100.0	monzogranite	grey w/fresh stress relaxation cracks	
990	27.3	39.5	29.9	2.7	.0	0.3	0.2	.0	0.0	0.0	.0	0.0	100.0	monzogranite	grey	
995	26.9	38.9	27.1	5.3	0.3	0.3	0.8	0.1	.0	0.2	0.0	0.0	100.0	monzogranite	grey	
1000	30.6	36.3	27.8	4.1	0.1	0.8	0.3	0.0	0.0	.0	0.0	0.2	100.1	monzogranite	grey w/white cgr portions	
1005	29.0	38.5	26.1	5.6	0.1	0.3	0.2	0.1	0.0	0.0	0.1	0.0	100.0	monzogranite	grey	
1010	29.2	40.5	25.4	3.7	0.2	0.7	0.1	0.0	0.0	0.0	0.0	0.1	99.9	monzogranite	grey & white inhomogenous	
1015	25.9	43.4	25.5	3.8	0.0	0.8	0.3	0.3	0.0	0.0	0.1	0.0	100.1	monzogranite	grey	
1020	28.1	40.3	26.0	4.8	0.1	0.4	0.1	0.1	0.0	.0	.0	.0	100.1	monzogranite	grey	
1025	32.1	41.2	22.9	3.0	0.1	0.3	0.3	0.0	0.0	.0	0.1	.0	100.0	monzogranite	grey	
1030	26.6	40.0	28.3	3.2	0.3	1.1	0.5	0.1	0.0	0.0	0.0	0.0	100.1	monzogranite	white to grey, inequigran. Vein	
1035	31.3	35.4	28.7	2.5	0.2	1.2	0.6	0.1	0.0	0.0	0.0	0.0	100.0	monzogranite	grey	
1040	33.0	39.2	26.6	0.5	0.1	0.2	0.2	0.1	0.0	0.1	0.0	0.0	100.0	monzogranite	white, inhomogeneous	
1045	27.7	33.8	34.2	3.4	0.1	0.5	0.2	0.0	.0	0.0	0.1	.0	100.0	monzogranite	grey	
1050	27.5	50.7	15.4	5.5	0.2	0.4	0.2	.0	0.0	0.0	0.1	.0	100.0	granddiorite	grey	
1055	29.8	33.0	30.8	5.3	0.3	0.4	0.2	0.1	0.0	0.0	0.2	0.0	100.1	monzogranite	grey	
1060	32.0	35.5	26.5	5.3	0.2	0.2	0.1	0.1	.0	0.0	0.1	0.0	100.0	monzogranite	grey. 3mm wide vein. fresh stress cracks	
1065	28.8	40.6	24.5	5.0	.0	0.5	0.3	0.2	0.0	0.0	0.1	.0	100.0	monzogranite	grey	
1070	31.7	34.3	28.3	4.3	0.3	0.5	0.3	0.1	0.0	.0	0.2	0.1	100.0	monzogranite	grey	
1075	28.4	39.6	26.7	3.7	0.5	0.3	0.5	0.1	0.2	.0	0.1	0.1	100.1	monzogranite	grey	
1080	35.9	42.2	18.9	2.2	0.3	0.2	0.2	.0	.0	0.1	.0	0.0	100.0	granddiorite	grey w/cgr leuco bands	
1085	30.6	37.8	27.0	3.3	0.3	0.4	0.5	0.0	0.1	0.1	0.0	0.0	100.0	monzogranite	Fresh stress cracks	
1094	26.7	46.3	20.4	4.3	0.3	0.7	0.8	0.1	0.2	.0	0.2	0.0	100.0	granddiorite	grey	
1100	31.4	28.7	37.5	1.5	0.4	0.3	0.1	.0	0.0	.0	0.0	0.0	100.0	monzogranite	grey to white, cgr	

Fig. 1 URL-6 Modes



A = QUARTZ-RICH GRANITOID, B = SYENOGRANITE, C = MONZOGRANITE, D = GRANODIORITE, E = TONALITE,
F = ALKALI QUARTZ-SYENITE, G = QUARTZ-SYENITE, H = QUARTZ-MONZONITE, I = QUARTZ MONZODIORITE,
J = QUARTZ-DIORITE, K = MONZODIORITE, L = DIORITE / GABBRO. (After Streckeisen 1976)

Fig. 2 URL-6 Pink Samples

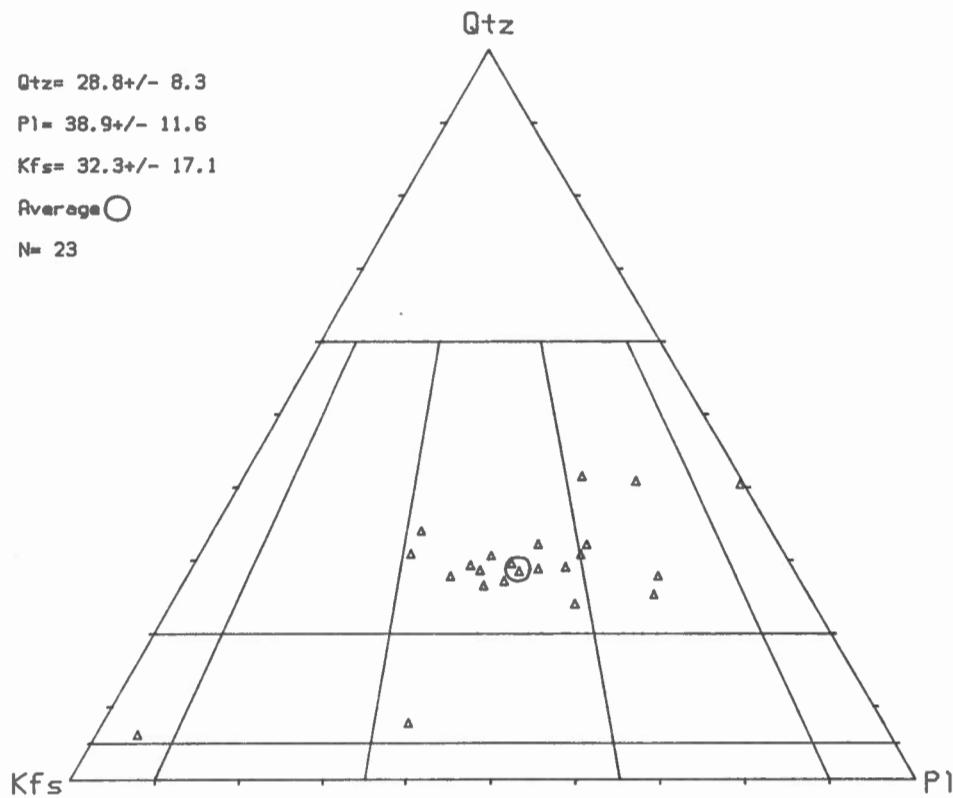


Fig. 3 URL-6 Grey Samples

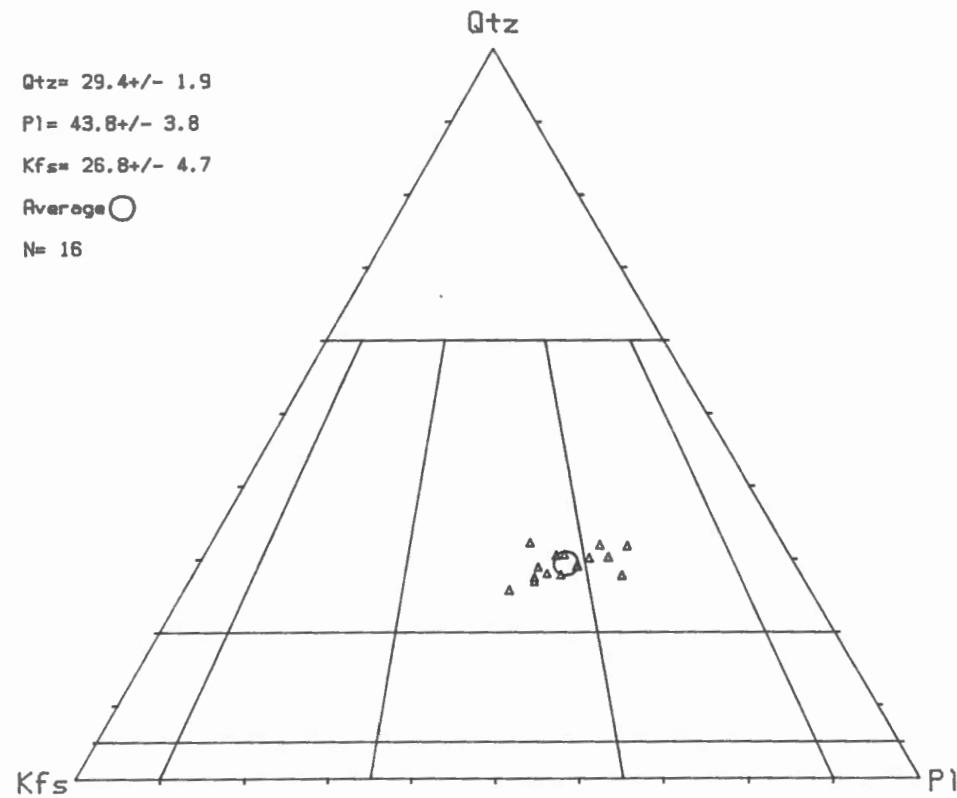


Fig. 4 URL-2 Grey Samples

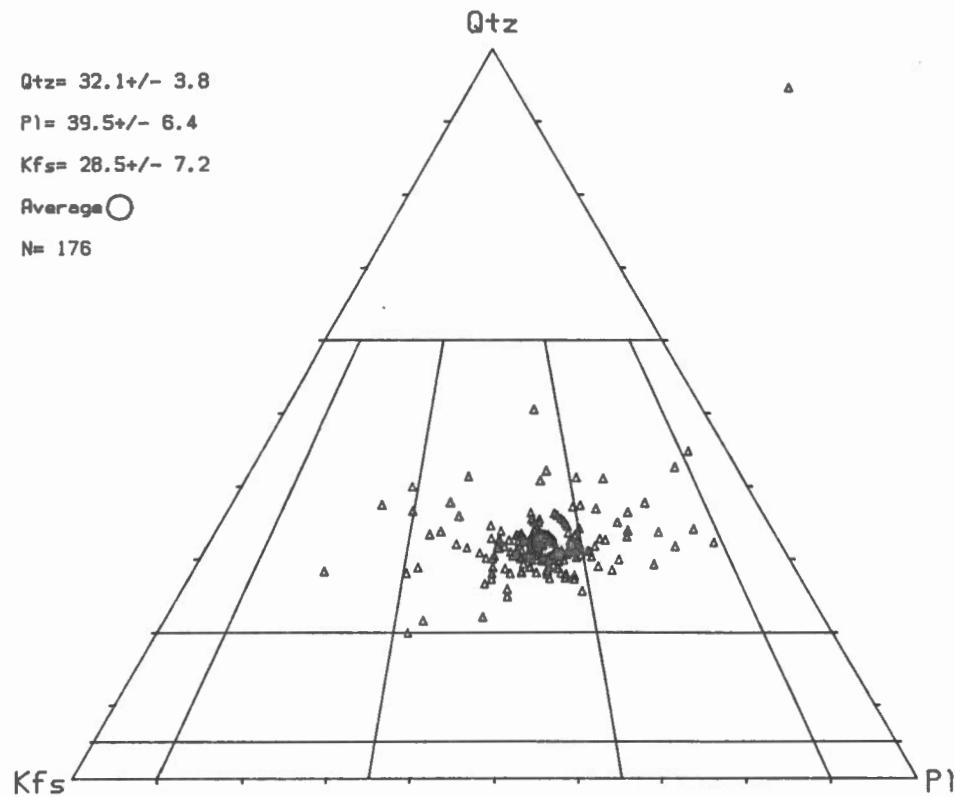


Fig.5 URL-2 Other Samples

