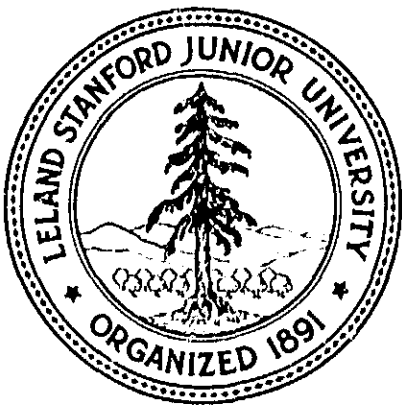


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STANFORD RSL TECH REPORT #68-2

"RE-EVALUATION OF THE NORMATIVE MINERALS OF  
SONORA PASS ROCK STANDARDS - UNIV. NEV. REPORTS #7 & #12

CONTRACT NAS9-7313

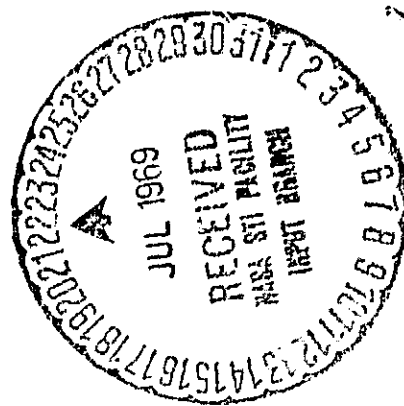
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION  
MANNED SPACECRAFT CENTER  
HOUSTON, TEXAS

by  
I.A. Kilinc, Research Geologist  
and  
R.J.P. Lyon, Principal Investigator  
REMOTE SENSING LABORATORY  
Mineral Engineering Department  
Stanford University  
Stanford, California

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November 16, 1968

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SCHOOL OF EARTH SCIENCES

STANFORD UNIVERSITY • STANFORD, CALIFORNIA

NASA CR 101787

STANFORD RSL TECH REPORT #68-2  
"RE-EVALUATION OF THE NORMATIVE MINERALS OF  
SONORA PASS ROCK STANDARDS - UNIV. OF NEV. RPTS. #7 & #12

by  
I.A. Kilinc and R.J.P. Lyon

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Already Issued

- 67-1 - PART I Original LMSC SG-4 Program Univac 1107 (Feb. 8, 1967)  
by R.J.P. Lyon et. al.
- 67-2 - "Field Infrared Analysis of Terrain - Spectral Correlation  
Program", by R.J.P. Lyon et. al. (March 30, 1967)
- 67-3 - "Statistical Analysis of IR Spectra - Stanford Programs  
Applied to USGS Spectra in Tech Letter #13", by R.J.P. Lyon  
et. al (Nov. 10, 1967).
- 67-4 - "Computer Reduction and Analysis of an Infrared Image", by  
Keenan Lee (December 31, 1967).
- 68-1 - "Infrared Exploration for Coastal and Shoreline Springs" by  
R.J.P. Lyon and Keenan Lee (November 1968).

The research described in #68-2 was performed under support from NASA  
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16 November 1968

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## I. INTRODUCTION

The chemical analyses and normative minerals of a number of rock samples collected from Sonora Pass NASA Test Site (Site #19) were published by the University of Nevada in their Technical Letters #7 and #12. A closer examination of the normative minerals obtained from several chemical analyses revealed that the method of calculation of normative minerals was not correct. Specifically, the weight percent sum of the normative minerals and the weight percent sum of oxides from which the norms were calculated was found to vary as much as 18 percent. Since the calculation of normative minerals involves rearrangement of the oxides in the form of pure minerals, the two sums should not deviate by more than one percent.

## II. NORMATIVE MINERALS

The same chemical analyses of 34 rock samples were used to recalculate the normative minerals. These chemical analyses were obtained from Technical Letters #7 and #12. In Table 1 the description of these samples are given as they appeared in the above mentioned Technical Letters.

A normative mineral calculation program originally written by J. Holloway and modified by I.A. Kilinc was used to calculate the normative minerals and several associated petrologic values of significance. The results are presented at the end of this report in the listings of computer output.

The weight percent normative minerals of the granitic rocks are plotted on two types of triangular diagrams, commonly used in the study of granitic rocks. Figure 1 shows the compositions of these 19 granitic rocks in terms of quartz-plagioclase (Ab + An) - orthoclase. Except point 1 which represents composition of Cinko lake "granodiorite", all others occupy the central part of the diagram suggesting that they are granodiorite to quartz monzonite in composition. Figure 2 shows

the compositions of the granitic rocks in terms of normative quartz-albite-orthoclase. Again, Cinko lake "granodiorite" plots quite differently to the rest of the rocks.

### III. SUMMARY AND CONCLUSIONS

It is a common practice to classify intrusive granitic rocks in terms of their modal mineralogy. Recently O'Connor (1965) proposed a classification for quartz-rich igneous rocks based on feldspar ratios. According to this classification the rock names are characterized as fields on a triangular diagram with molecular percentage of normative orthoclase, albite and anorthite as the vertices of the triangle.

The nineteen granitic rocks listed in Table 2 have been plotted on a normative Or-Ab-An diagram in Figure 3 for the purpose of reclassification. It is clear from Figure 3 that Cinko Lake granodiorite (point 1) is actually tonalite in composition. It is also clear that Dorothy Lake alaskite (points 483 and 3) is granite in composition. Furthermore Fremont Lake quartz monzonite (601 and 4), Bond Pass quartz monzonite (7), Topaz Lake quartz monzonite (9, 10) could be better classified as granodiorites. Finally Cinko Lake granodiorite plots in the tonalite field. Table 3 shows the old and the new classifications of these rocks. These modified results were considered of enough petrographic significance to justify the republication of some of the results of Technical letters #7 and #12.

#### IV. REFERENCES

- SJOBERG, James, Sonora Pass Standards; University of Nevada, Reno, NASA Technical Letter Number 7, 1967.
- QUADE, J.Q., Chapman, P.E., and Brennan, P.A., Surface Chemistry of Major Rock Types of Sonora Pass Test Site, California; University of Nevada, Reno, NASA Technical Letter Number 12, 1968.
- O'CONNOR, J.T., A Classification of Quartz-rich Igneous Rocks Based on Feldspar Ratios; U.S. Geological Survey Prof. Paper 525-B, pp. B79-B84, 1965.

#### V. FIGURE CAPTIONS

- Figure 1: Compositions of 19 "granitic" rocks in terms of weight percent normative quartz-plagioclase-orthoclase.
- Figure 2: Compositions of 19 "granitic" rocks in terms of weight percent quartz-albite-orthoclase.
- Figure 3: Compositions of 19 "granitic" rocks in terms of molecular percents of albite-orthoclase-anorthite.



TABLE 1

*N477:	Fresh Cinko lake granodiorite
*N478:	Fresh Cinko lake granodiorite
*N482	Cinko lake granodiorite (glacial pavement)
*N483:	Fresh Dorothy lake alaskite
N489:	Green phase (metamorphic rock)
N490:	Dark phase (metamorphic rock)
N493:	Dark phase (metamorphic rock)
N494:	Green phase, horizontal (metamorphic rock)
N496:	Pink phase
N466:	Iron stained, polished Fremont lake quartz monzonite
N499:	Iron stained Fremont lake quartz monzonite
*N601:	Grus on Fremont lake quartz monzonite
*N602:	Fresh pink Fremont lake quartz monzonite
*N625:	Weathered Fremont lake quartz monzonite
N606:	Agglomerate (Relief Peak andesite)
N607:	Agglomerate (Relief Peak andesite)
N612:	Fresh Topaz lake porphyritic quartz monzonite
N616:	Brown Bear basalt
N617:	Brown Bear basalt
N619:	Surface (Brown Bear basalt)
*1 (N159):	Cinko lake granodiorite
*2 (N161):	Patterson grade granodiorite
*3 (N162):	Dorothy lake alaskite
*4 (N191):	Fremont lake quartz monzonite
*5 (N192):	Bond Pass quartz monzonite
*6 (N303):	Cascade creek granodiorite
*7 (N306):	Mill creek quartz monzonite
*8 (N313):	Patterson grade granodiorite
*9 (N332):	Topaz lake quartz monzonite
*10 (N335):	Topaz lake quartz monzonite
11 (N163):	Brown Bear pass basalt
*12 (N165):	Valley Spring rhyolite
14 (N195):	Metasediment
15 (N 196):	Metasediment

\*Indicates those rocks that are used in Figures 1, 2 and 3.

TABLE 2

Compositions of "granitic" rocks in terms of molecular percents of normative albite, orthoclase and anorthite

ROCK	Ab	Or	An
N477	50.7	23.9	25.4
N478	46.7	27.7	25.6
N482	49.7	22.7	27.6
N483	51.4	48.6	0.0
N601	50.5	23.4	26.1
N602	45.7	35.9	18.4
N612	42.3	36.3	21.4
N625	45.4	35.2	19.4
1	51.7	3.00	45.3
2	48.6	30.4	21.0
3	55.4	38.8	5.8
4	48.9	27.5	23.6
5	54.0	27.4	18.6
6	47.8	24.2	28.0
7	53.5	28.2	18.3
8	47.1	27.0	25.9
9	49.3	32.7	18.0
10	52.2	31.9	15.9
12	40.8	54.7	4.5

TABLE 3

IDENTIFICATION NO.	NEW CLASSIFICATION	OLD CLASSIFICATION
N478	Granodiorite	Granodiorite
N477	Granodiorite	Granodiorite
N482	Granodiorite	Granodiorite
N483	Granite	Alaskite
N601	Granodiorite	Quartz Monzonite
N602	Quartz Monzonite	Quartz Monzonite
N612	Quartz Monzonite	Quartz Monzonite
N622	Quartz Monzonite	Quartz Monzonite
1	Donalite	Granodiorite
2	Granodiorite	Granodiorite
3	Granite	Alaskite
4	Granodiorite	Quartz Monzonite
5	Granodiorite	Quartz Monzonite
6	Granodiorite	Granodiorite
7	Granodiorite	Quartz Monzonite
8	Granodiorite	Granodiorite
9	Granodiorite	Quartz Monzonite
10	Granite	Quartz Monzonite
12	Granite (Rhyolite)	Rhyolite

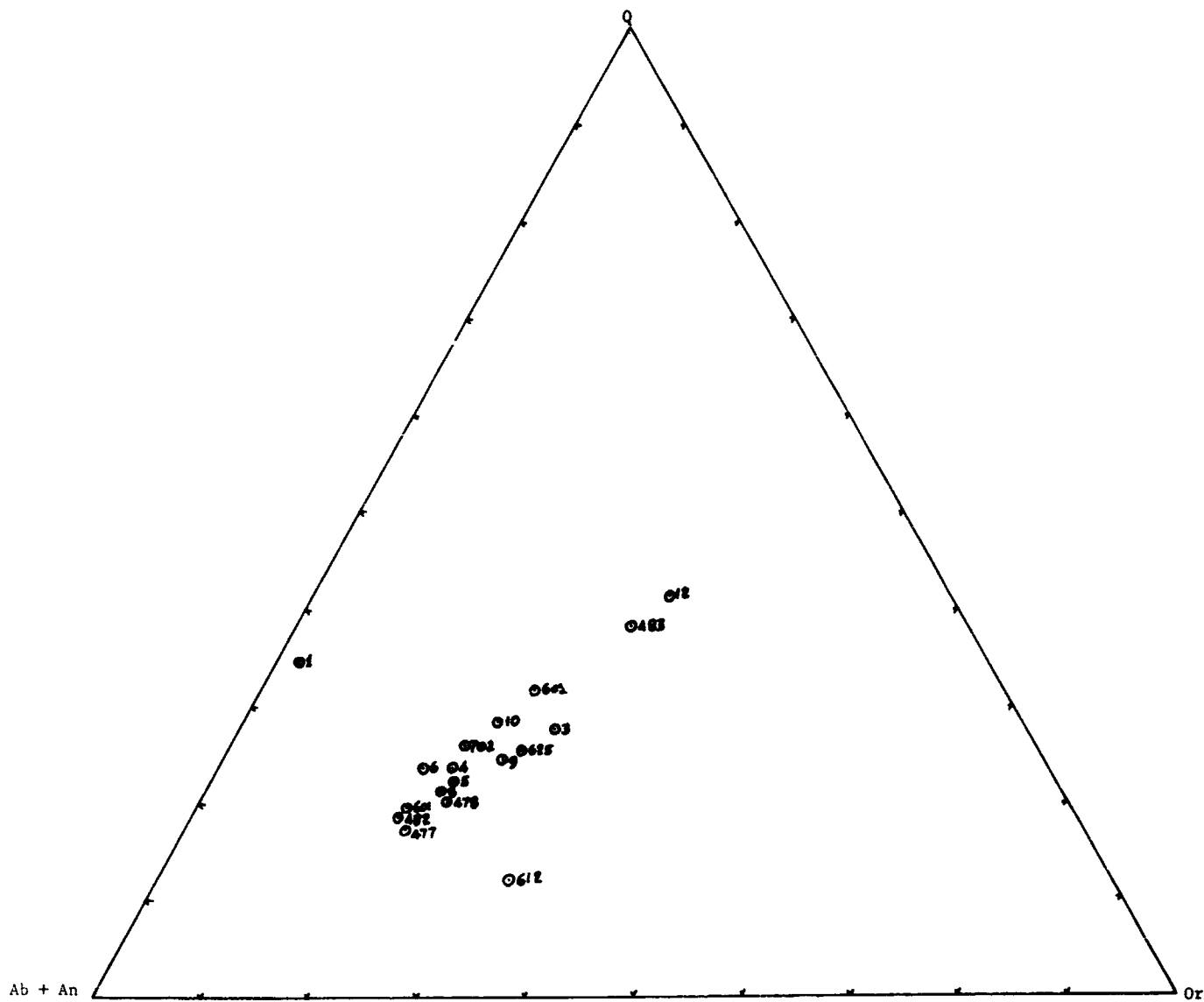


FIGURE 1

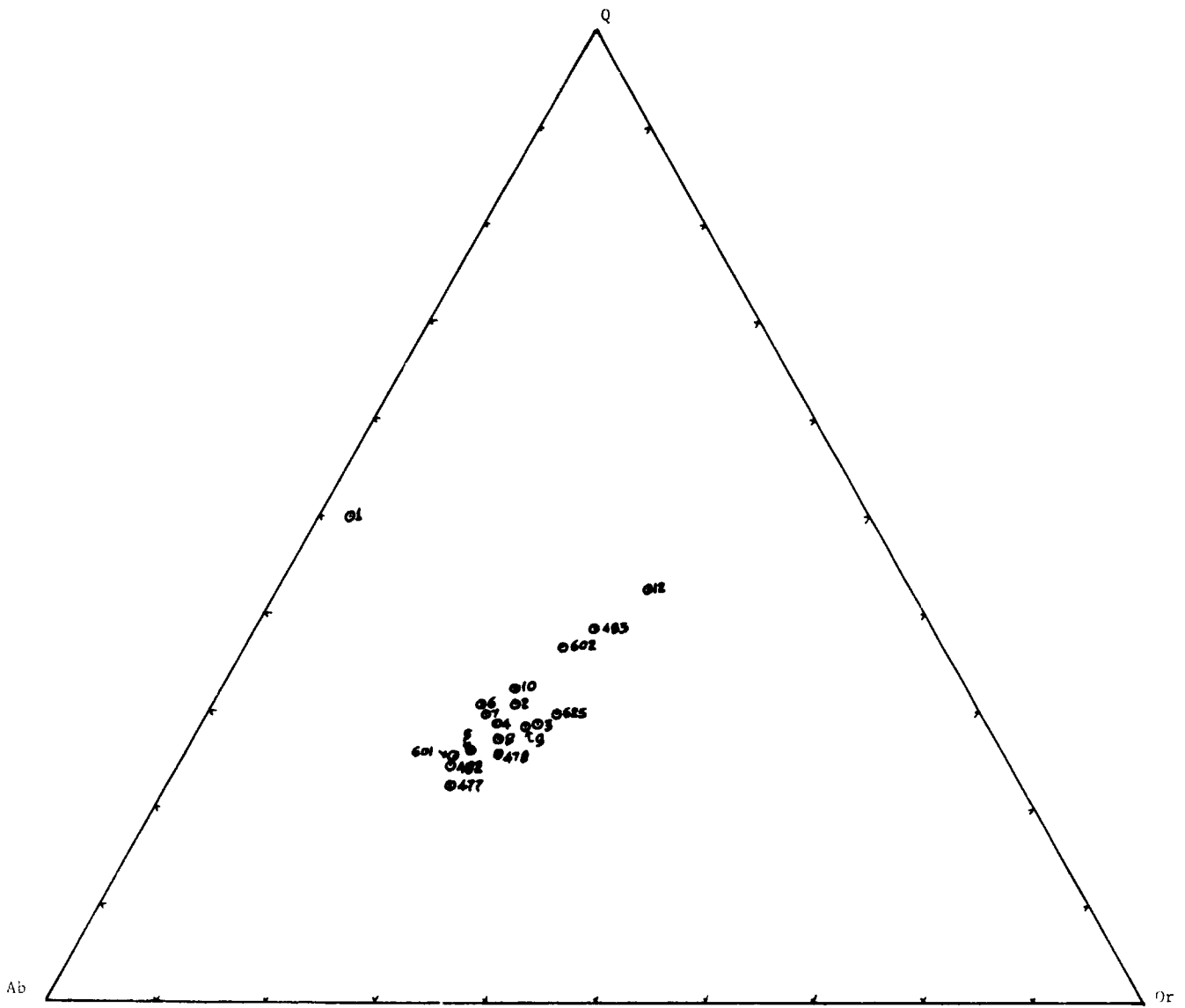


FIGURE 2

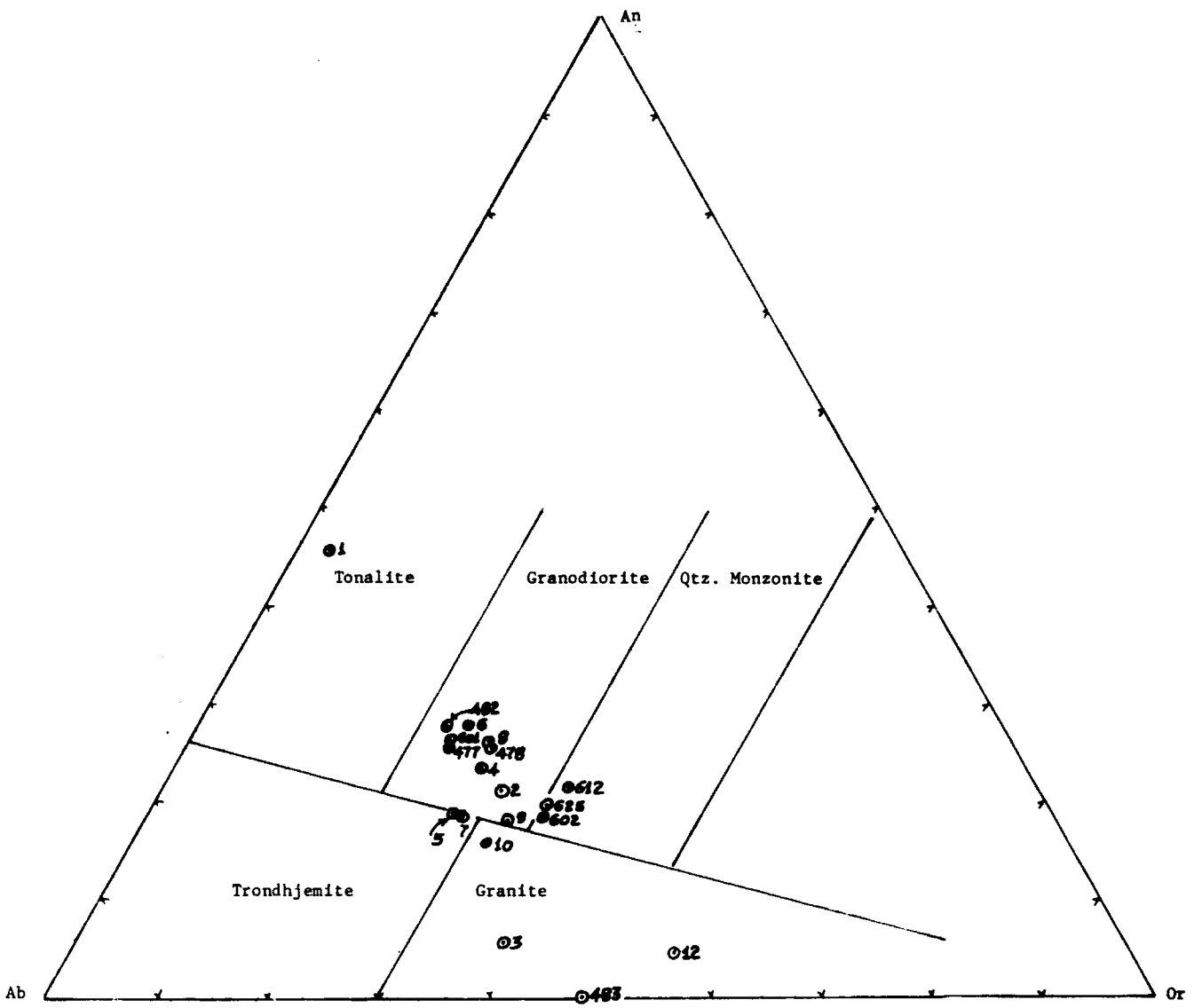


Figure 3

AI

SAMPLE NUMBER N477

OXIDE	WT PCT	MOLE PCT	NORMATIVE MINERALS	WT PCT	MOLE PCT
SiO2	58.41	65.97	KS	0.0	0.0
TiO2	1.13	0.96	KP	0.0	0.0
Al2O3	14.27	9.50	LC	0.0	0.0
Fe2O3	9.50	4.04	NS	0.0	0.0
FeO	0.0	0.0	DR	14.83	5.27
MnO	0.0	0.0	AR	29.70	11.19
MgO	3.27	5.50	AN	15.77	11.20
CaO	6.92	8.37	NE	0.0	0.0
Na2O	3.51	3.84	Q	12.69	41.75
K2O	2.51	1.81	OL	0.0	0.0
P2O5	0.0	0.0	FO	0.0	0.0
RAO	0.0	0.0	FA	0.0	0.0
SR0	0.0	0.0	LN	0.0	0.0
CR2O3	0.0	0.0	HY	2.86	5.64
F	0.0	0.0	EN	2.86	5.64
CL	0.0	0.0	FS	0.0	0.0
SO3	0.0	0.0	DI	11.39	10.39
S	0.0	0.0	WO	6.11	5.20
Cr2	0.0	0.0	EN	5.28	5.20
ZrO2	0.0	0.0	FS	0.0	0.0
			MO	0.0	0.0
			AC	0.0	0.0
			AP	0.0	0.0
			IL	0.0	0.0
			SP	2.77	2.80
			RU	0.0	0.0
			PV	0.0	0.0
			C	0.0	0.0
			MT	0.0	0.0
			HEM	9.50	11.76
			CH	0.0	0.0
			HL	0.0	0.0
			FR	0.0	0.0
			TH	0.0	0.0
			PR	0.0	0.0
			NC	0.0	0.0
			CC	0.0	0.0
			Z	0.0	0.0

99.52

PETROLOGIC VALUES: (IN MOLE PCT UNLESS INDICATED AS WT PCT BY W)

RATIOS	WT PCT	MOLE PCT	UNLESS INDICATED AS WT PCT BY W)
KUNO SI M	36.228	A	31.29
KUNO SI	17.403	C	46.76
PELDERVAART	24.090	F	22.35
COOMBS	0.453	A	50.66
LARSEN	9.016	F	0.0
THORNTON II	2.598	M	49.34
THORNTON DI	58.211	ALK	24.18
CI	21.818	AL	16.46
AL2O3/SiO2	0.144	CFM	59.37
FEMG	42.313		0.0
FE2/FE3	0.0	II	3.14
NA + K	5.652	DI	26.41
NA + K/A	0.595	CI	70.45
AL2/Si6	0.028		0.0
		A/MG	1.03

99.52

GRANITE TETRAHEDRON-W-

OR	WT PCT	MOLE PCT
OR	14.83	24.60
AB	29.70	49.25
AN	15.77	26.15
Q	12.69	0.0
PLAG	0.0	0.0
	25.92	0.0
	51.90	0.0
	0.0	0.0
	27.11	0.0
	21.82	0.0
	22.18	0.0
	0.0	0.0
	34.26	0.0
	0.0	0.0
	51.07	0.0
	36.42	0.0
	29.31	0.0
	0.0	0.0
	20.32	0.0

A2

SAMPLE NUMBER M479

OXIDE	WT PCT	MOLE PCT	NORMATIVE MINERALS	WT PCT	MOLE PCT
SiO2	58.84	66.82	KS	0.0	0.0
TiO2	1.32	1.13	KP	0.0	0.0
Al2O3	13.74	9.20	LC	0.0	0.0
Fe2O3	8.57	3.66	NS	0.0	0.0
FeO	0.0	0.0	OR	16.55	5.59
MnO	0.0	0.0	AB	26.32	9.44
MgO	3.34	5.65	AN	15.26	10.33
CaO	6.65	8.09	NE	0.0	0.0
Na2O	3.11	3.42	Q	14.63	45.83
K2O	2.80	2.03	OL	0.0	0.0
P2O5	0.0	0.0	FO	0.0	0.0
BaO	0.0	0.0	FA	0.0	0.0
SrO	0.0	0.0	LN	0.0	0.0
CR2O3	0.0	0.0	HY	3.58	6.71
F	0.0	0.0	EN	3.58	6.71
CL	0.0	0.0	FS	0.0	0.0
SO3	0.0	0.0	DI	10.22	8.88
S	0.0	0.0	WO	5.48	4.44
CO2	0.0	0.0	EM	4.74	4.44
ZRO2	0.0	0.0	FS	0.0	0.0
			WO	0.0	0.0
			AC	0.0	0.0
			AP	0.0	0.0
			IL	0.0	0.0
			SP	3.24	3.11
			RU	0.0	0.0
			PV	0.0	0.0
			C	0.0	0.0
			MT	0.0	0.0
			HEM	8.57	10.10
			CH	0.0	0.0
			HL	0.0	0.0
			FR	0.0	0.0
			TH	0.0	0.0
			PR	0.0	0.0
			NC	0.0	0.0
			CC	0.0	0.0
			Z	0.0	0.0

98.37

PETROLOGIC VALUES: (IN MOLE PCT UNLESS INDICATED AS WT PCT BY W)

RATIOS	WT PCT	MOLE PCT	TRIANGLAR PLOTS	WT PCT	MOLE PCT
KUNO S: M	3P-280		A	31.69	27.34
KUNO S: I	18.743		C	47.03	0.0
POLDERVAART	19.308		F	21.28	0.0
COOMBS	0.470		A	49.10	9.28
LARSEN	0.543		F	0.0	63.39
THORNTON II	2.221		M	50.90	0.0
THORNTON DI	60.873		ALK	23.77	0.0
CT	20.342		AL	16.32	0.0
AL2O3/SIO2	0.139		CEM	59.91	0.0
FEMC	39.314		IT	0.0	10.92
FE2/FE3	0.0		DI	24.38	0.0
NA + K	5.452		CI	72.96	0.0
NA + K/A	0.593				
AL2/Si6	0.027		A/MC	0.96	0.96

GRANITE TETRAHEDRON-W-

OR	16.55	28.47	28.78	0.0	35.63	22.74
AB	26.32	45.27	45.77	46.82	0.0	0.0
AN	15.26	26.26	0.0	27.15	32.86	0.0
Q	14.63	0.0	25.45	26.03	31.51	20.11
PLAG	0.0	0.0	0.0	0.0	0.0	57.15





A4

SAMPLE NUMBER N483

OXIDE	WT PCT	MOLE PCT	FORMATIVE MINERALS	WT PCT	MOLE PCT
SiO2	77.39	40.43	KS	0.0	0.0
TiO2	0.18	0.14	KP	0.0	0.0
Al2O3	12.34	7.56	LC	0.0	0.0
Fe2O3	1.16	0.45	NS	0.0	0.0
FeO	0.0	0.0	OR	28.31	6.43
MnO	0.0	0.0	AB	28.19	6.79
MgO	3.15	4.89	AN	0.0	0.0
CaO	0.0	0.0	NE	0.0	0.0
Na2O	3.33	3.36	0	34.98	73.61
K2O	4.70	3.18	DL	0.0	0.0
P2O5	0.0	0.0	FD	0.0	0.0
BaO	0.0	0.0	FA	0.0	0.0
SrO	0.0	0.0	LN	0.0	0.0
CR2O3	0.0	0.0	HY	7.84	9.88
F	0.0	0.0	EN	7.84	9.88
CL	0.0	0.0	FS	0.0	0.0
SO3	0.0	0.0	DI	0.0	0.0
S	0.0	0.0	MO	0.0	0.0
CO2	0.0	0.0	EM	0.0	0.0
ZRO2	0.0	0.0	FS	0.0	0.0
			WO	0.0	0.0
			AC	0.0	0.0
			AP	0.0	0.0
			IL	0.0	0.0
			SP	0.0	0.0
			RU	0.18	0.28
			PV	0.0	0.0
			C	1.68	2.08
			HT	0.0	0.0
			HEM	1.16	0.92
			CH	0.0	0.0
			HL	0.0	0.0
			FR	0.0	0.0
			TH	0.0	0.0
			PR	0.0	0.0
			NC	0.0	0.0
			CC	0.0	0.0
			Z	0.0	0.0

102.33

PETROLOGIC VALUES: (TM MOLE PCT UNLESS INDICATED AS WT PCT BY W) TRIANGULAR PLOTS BASALT TETRAHEDRON

RATIO	WT PCT	MOLE PCT	MINERAL	WT PCT	MOLE PCT
KUNO SI M	41.126	93.51	PLAG	7.52	7.52
KUNO SI	25.342	0.0	NE	0.0	0.0
POLDERVAART	12.813	6.49	DL	0.0	0.0
COOMBS	0.531	57.24	HY	10.94	10.94
LARSEN	23.520	0.0	Q	81.53	81.53
THORNTON II	2.081	42.76	0	0.0	0.0
THORNTON DI	86.837	52.51	CPX	0.0	0.0
CI	4.939	8.26	NE	0.0	0.0
AL2O3/SiO2	0.094	39.23	DL	0.0	0.0
FEMG	8.507	0.0	HY	11.83	11.83
FEZ/FE3	0.0	2.22	Q	88.17	88.17
NA + K	6.532	5.26	0	0.0	0.0
NA + K/A	0.864	92.52	0	0.0	0.0
AL2/Si6	3.027	0.0	A/MG	1.34	1.34

102.33

MINERAL	WT PCT	MOLE PCT
OR	28.31	50.11
AB	28.18	49.89
AN	0.0	0.0
Q	34.98	0.0
PLAG	0.0	0.0

GRANITE TETRAHEDRON-W-

102.33

A5

SAMPLE NUMBR N489

OXIDE	WT PCT	MOLE PCT	NORMATIVE MINERALS	WT PCT	MOLE PCT
SiO2	68.34	72.46	KS	0.0	0.0
TiO2	0.53	0.50	KP	0.0	0.0
Al2O3	11.44	7.15	LC	0.0	0.0
Fe2O3	3.59	1.43	MS	0.0	0.0
FeO	0.0	0.0	DR	33.69	8.15
MnO	0.0	0.0	AB	0.0	0.0
MgO	2.53	4.00	AN	14.38	6.96
CaO	9.33	10.60	NE	0.0	0.0
Na2O	0.0	0.0	Q	29.65	66.43
K2O	5.70	3.86	OL	0.0	0.0
P2O5	0.0	0.0	FO	0.0	0.0
RAO	0.0	0.0	FA	0.0	0.0
SRO	0.0	0.0	LN	0.0	0.0
CR2O3	0.0	0.0	HY	0.0	0.0
F	0.0	0.0	EN	0.0	0.0
CL	0.0	0.0	FS	0.0	0.0
SO3	0.0	0.0	DI	13.59	8.45
S	0.0	0.0	MO	7.29	4.22
CO2	0.0	0.0	EN	6.30	4.22
ZRO2	0.0	0.0	FS	0.0	0.0
			MO	5.12	5.93
			AC	0.0	0.0
			AP	0.0	0.0
			TL	0.0	0.0
			SP	1.55	1.06
			RU	0.0	0.0
			PV	0.0	0.0
			C	0.0	0.0
			NT	0.0	0.0
			HEM	3.59	3.03
			CH	0.0	0.0
			HL	0.0	0.0
			FR	0.0	0.0
			TH	0.0	0.0
			PR	0.0	0.0
			MC	0.0	0.0
			CC	0.0	0.0
			Z	0.0	0.0

101.56

PETROLOGIC VALUES: (IN MOLE PCT UNLESS INDICATED AS WT PCT BY W)

RATIOS	WT PCT	MOLE PCT	MINERALS	WT PCT	MOLE PCT
KUNO SI M	43.056	24.27	PLAG	9.48	9.48
KUNO SI	21.404	66.72	NE	0.0	0.0
POLDERVAART	0.0	0.01	OL	0.0	0.0
COOMBS	0.456	49.09	HY	0.0	0.0
LARSEN	11.484	0.0	Q	90.52	90.52
MORNTON II	2.112	50.91	CPX	11.29	11.29
MORNTON DI	74.576	17.73	NE	0.0	0.0
CI	13.295	15.14	OL	0.0	0.0
AL2O3/SIO2	0.099	67.13	HY	0.0	0.0
FEMG	26.376	0.0	Q	88.72	88.72
FE2/FE3	0.0	2.35			
NA + K	3.855	14.77			
NA + K/A	0.539	0.0			
AL2/Si6	0.018	0.0	A/MG	0.96	0.96

GRANITE TETRAHEDRON-W-

MINERAL	WT PCT	MOLE PCT
DR	33.69	70.08
AB	0.0	0.0
AN	14.38	29.92
Q	29.65	67.34
PLAG	0.0	0.0

53.19

0.0

43.34

43.34

0.0

0.0

18.15

18.50

AL

SAMPLE NUMBER N400

OXIDE	WT PCT	MOLE PCT	ACUMULATIVE MINERALS	WT PCT	MOLE PCT
SiO2	66.02	71.33	KS	0.0	0.0
TiO2	0.78	0.51	KP	0.0	0.0
Al2O3	10.63	6.90	LC	0.0	0.0
Fe2O3	5.66	2.25	NS	0.0	0.0
FeO	0.0	0.0	OR	39.60	10.23
MnO	0.0	0.0	AB	0.0	0.0
MgO	5.39	8.64	AN	9.90	5.12
CaO	5.17	5.95	NE	0.0	0.0
Na2O	0.0	0.0	Q	24.67	59.05
K2O	6.70	4.66	PL	0.0	0.0
P2O5	0.0	0.0	FO	0.0	0.0
BaO	0.0	0.0	FA	0.0	0.0
SrO	0.0	0.0	LN	0.0	0.0
CR2O3	0.0	0.0	HY	8.69	12.45
F	0.0	0.0	EN	8.69	12.45
CL	0.0	0.0	FS	0.0	0.0
SO3	0.0	0.0	DI	10.20	6.77
S	0.0	0.0	MO	5.47	3.39
CO2	0.0	0.0	EN	4.73	3.39
ZrO2	0.0	0.0	FS	0.0	0.0
			MD	0.0	0.0
			AC	0.0	0.0
			AP	0.0	0.0
			IL	0.0	0.0
			SP	1.86	1.37
			RU	0.0	0.0
			PV	0.0	0.0
			C	0.0	0.0
			MT	0.0	0.0
			HEM	5.36	5.01
			CH	0.0	0.0
			HL	0.0	0.0
			FR	0.0	0.0
			TH	0.0	0.0
			PR	0.0	0.0
			MC	0.0	0.0
			CC	0.0	0.0
			Z	0.0	0.0

100.48

100.48

PETROLOGIC VALUES: (IN MOLE PCT UNLESS INDICATED AS WT PCT BY W)

RATIOS	W	M	TRIANGULAR PLOTS	AS WT PCT BY W	BASALT TETRAEDRON
KUNO SI	55.788	35.90	PLAG	6.68	GRANITE TETRAEDRON-W-
KUNO SI	30.538	46.53	NE	0.0	OR
POLDERVAART	-17.029	17.57	OL	0.0	AB
COMBSS	0.508	36.73	HY	16.26	AN
LARSEN	11.374	0.0	Q	77.06	Q
THORNTON TI	1.694	65.27		0.0	PLAG
THORNTON DI	69.276	21.39	Cpx	8.65	
CI	16.427	10.70	NE	0.0	
AL2O3/SiO2	0.097	67.91	OL	0.0	
FEMG	20.667	0.0	HY	15.91	
FE2, FE3	0.0	1.94	Q	75.43	
NA + K	4.508	18.60		0.0	
NA + K/A	0.667	79.27		0.0	
AL2/Si6	0.22	0.0	A/MG	0.53	

GRANITE TETRAEDRON-W-	WT PCT	MOLE PCT
OR	39.60	80.00
AB	0.0	0.0
AN	9.90	20.00
Q	24.67	0.0
PLAG	0.0	0.0

61.62

0.0

53.39

53.39

A7

SAMPLE NUMBER N493

OXIDE	WT PCT	MOLE PCT	NORMATIVE MINERALS	WT PCT	MOLE PCT
SiO2	64.54	68.69	KS	0.0	0.0
TiO2	0.75	0.60	KP	0.0	0.0
Al2O3	12.35	7.77	LC	0.0	0.0
Fe2O3	6.74	2.71	NS	0.0	0.0
FeO	0.0	0.0	OR	18.67	4.68
MnO	0.0	0.0	AB	7.70	2.05
MgO	3.91	6.22	AN	20.28	10.16
CaO	9.37	10.72	NE	0.0	0.0
Na2O	0.91	0.94	O	26.90	62.41
K2O	3.16	2.15	OL	0.0	0.0
P2O5	0.0	0.0	FO	0.0	0.0
BaO	0.0	0.0	FA	0.0	0.0
SrO	0.0	0.0	LN	0.0	0.0
CR2O3	0.0	0.0	HY	0.0	0.0
F	0.0	0.0	EN	1.22	1.70
CL	0.0	0.0	FS	1.22	1.70
SO3	0.0	0.0	DI	18.37	11.82
S	0.0	0.0	WO	9.85	5.91
CO2	0.0	0.0	EN	8.51	5.91
ZnO2	0.0	0.0	FS	0.0	0.0
			WD	0.0	0.0
			AC	0.0	0.0
			AP	0.0	0.0
			IL	0.0	0.0
			IL	0.0	0.0
			SP	1.84	1.31
			PV	0.0	0.0
			RU	0.0	0.0
			C	0.0	0.0
			MT	0.0	0.0
			HEM	6.74	5.88
			CH	0.0	0.0
			HL	0.0	0.0
			FR	0.0	0.0
			TH	0.0	0.0
			PR	0.0	0.0
			MC	0.0	0.0
			CC	0.0	0.0
			Z	0.0	0.0

101.73

101.73

PETROLOGIC VALUES: (IN MOLE PCT UNLESS INDICATED AS WT PCT BY W)

RATIOS	WT PCT	MOLE PCT	TRANGULAR PLOTS	WT PCT	MOLE PCT
KUNO SI M	51.746	A	18.73	PLAG	16.00
KUNO SI	26.562	C	64.88	NE	0.0
POLDERVAART	5.305	F	16.39	OL	0.0
COOMBS	0.444	A	33.21	HY	2.22
LARSEN	7.103	F	0.0	Q	81.78
THORNTON II	2.955	M	66.79		0.0
THORNTON DI	69.131	ALK	12.52	CPX	15.57
CI	19.875	AL	18.93	NE	0.0
AL2O3/SiO2	0.113	CFM	68.55	OL	0.0
FE2/FE3	30.324		0.0	HY	2.24
NA + K	0.0	II	3.21	Q	92.20
NA + K/A	3.093	DI	21.61		0.0
AL2/Si6	0.015	CI	75.17	A/MG	0.50
			0.0		

GRANITE TETRAHEDRON-W-

OR	16.67	40.03	35.05	0.0	28.35	25.39
AB	7.70	16.50	14.45	14.03	0.0	0.0
AN	20.28	43.47	0.0	36.95	50.79	0.0
Q	26.90	0.0	50.50	49.02	40.85	36.57
PLAG	0.0	0.0	0.0	0.0	0.0	38.04

A8

SAMPLE NUMBER M494

OXIDE	WT PCT	SPCT	NOMINATIVE MINERALS	WT PCT	MOLE PCT
SiO2	71.74	77.74	KS	0.0	0.0
TiO2	0.73	0.50	KP	0.0	0.0
Al2O3	12.94	8.20	LC	0.0	0.0
Fe2O3	2.74	0.97	NS	0.0	0.0
FEP	0.0	0.0	OR	34.22	7.56
MNO	0.0	0.0	AR	0.0	0.0
MCO	1.38	2.23	AN	17.94	7.93
CaO	5.44	6.32	NE	0.0	0.0
MA2O	0.0	0.0	O	77.44	77.44
K2O	5.79	4.00	OL	0.0	0.0
P2O5	0.0	0.0	FO	0.0	0.0
RAM	0.0	0.0	FA	0.0	0.0
SR0	0.0	0.0	LN	0.0	0.0
CR2O3	0.0	0.0	HY	1.09	1.33
F	0.0	0.0	EN	1.09	1.33
CL	0.0	0.0	FS	0.0	0.0
SO3	0.0	0.0	DI	5.07	2.88
S	0.0	0.0	MO	2.72	1.44
CO2	0.0	0.0	EN	2.35	1.44
ZRO2	0.0	0.0	FS	0.0	0.0
			MO	0.0	0.0
			AC	0.0	0.0
			AP	0.0	0.0
			IL	0.0	0.0
			SP	1.79	1.12
			RU	0.0	0.0
			PV	0.0	0.0
			C	0.0	0.0
			MT	0.0	0.0
			HEM	2.25	1.73
			CH	0.0	0.0
			HL	0.0	0.0
			FR	0.0	0.0
			TH	0.0	0.0
			PR	0.0	0.0
			NC	0.0	0.0
			CC	0.0	0.0
			Z	0.0	0.0

100.17

100.17

PETROLOGIC VALUES: (IN MOLE PCT UNLESS INDICATED AS WT PCT BY WJ)

RATIOS	NUMB SI	W	TRIANGULAR PLOTS	RASALY TETRAHEDRON	GRANITE TETRAHEDRON-W-
	31.177	A	35.62	PLAC	9.15
	14.650	C	56.22	NE	0.0
	-2.129	F	8.16	OL	0.0
	0.491	A	64.23	HY	1.54
	18.369	F	0.0	O	89.32
	0.720	M	35.77		0.0
	85.000	ALK	23.90	CPIX	3.53
	10.757	AL	25.07	ME	0.0
	0.105	CFM	51.03	OL	0.0
	25.160		0.0	HY	1.63
	0.0	II	0.75	O	94.84
	4.002	DI	11.15		0.0
	0.488	CI	88.10		0.0
	0.017		0.0	A/MG	1.80

OR

AB

AN

O

PLAC

47.50

0.0

0.0

0.0

0.0

32.17

67.83

0.0

42.03

0.0

19.93

0.0

0.0

0.0

0.0

0.0

0.0

0.0

0.0

0.0

0.0

0.0



A10

GEORGE HUNTER 1966

OXIDE	WT PCT	MOLE PCT	FORMATIVE MINERALS	WT PCT	MOLE PCT
SiO2	60.00	70.01	KS	0.0	0.0
TiO2	0.71	0.62	KP	0.0	0.0
Al2O3	15.10	10.98	LC	0.0	0.0
Fe2O3	7.67	3.32	NS	0.0	0.0
FeO	0.0	0.0	OR	17.79	5.62
MnO	0.0	0.0	AR	25.22	8.45
MgO	2.31	4.02	AN	18.94	11.97
CaO	4.82	6.03	NE	0.0	0.0
Na2O	2.98	3.37	O	18.45	53.99
K2O	3.01	2.24	OL	0.0	0.0
P2O5	0.0	0.0	FN	0.0	0.0
RAO	0.0	0.0	FA	0.0	0.0
SRO	0.0	0.0	LN	0.0	0.0
CR2O3	0.0	0.0	HY	4.85	8.49
F	0.0	0.0	FN	4.85	8.49
CL	0.0	0.0	FS	0.0	0.0
SO3	0.0	0.0	DI	1.95	1.58
S	0.0	0.0	HO	1.05	0.79
CO2	0.0	0.0	EN	0.90	0.79
ZRO2	0.0	0.0	FS	0.0	0.0
			MO	0.0	0.0
			AC	0.0	0.0
			AP	0.0	0.0
			IL	0.0	0.0
			SP	1.74	1.56
			RU	0.0	0.0
			PV	0.0	0.0
			C	0.0	0.0
			HT	0.0	0.0
			HEM	7.57	8.34
			CH	0.0	0.0
			HL	0.0	0.0
			FR	0.0	0.0
			TH	0.0	0.0
			PR	0.0	0.0
			NC	0.0	0.0
			CC	0.0	0.0
			Z	0.0	0.0

96.50

96.50

96.50

PETROLOGIC VALUES: IN MOLE PCT UNLESS INDICATED AS WT PCT BY WJ

	TRIANGULAR PLOTS	BASALT TETRAHEDRON
RATIO SI	A 37.51	PLAG 74.64
KUNO SI	C 40.28	NE 0.0
POLDERVAART	F 27.21	OL 0.0
FOHRS	A 58.28	HY 10.24
LARSEN	F 0.0	Q 65.12
THORNTON II	M 41.72	0.0
THORNTON DI	ALK 27.47	CPX 2.47
CI	AI 23.36	NE 0.0
AL2O3/SIO2	CFM 49.17	OL 0.0
FFMG	45.277	HY 13.26
FE2/FE3	0.0	Q 44.27
MA + K	5.612	0.0
MA + K/A	0.540	0.0
AL2/SI6	0.027	A/MG 1.40

96.50

GRANITE TETRAHEDRON-W-

OR	17.79	28.72	28.95	0.0	32.24	22.13
AB	25.22	40.71	41.03	40.28	0.0	0.0
AN	18.94	30.57	U.0	30.25	34.32	0.0
Q	18.45	0.0	30.02	29.47	33.44	22.95
PLAG	0.0	0.0	0.0	0.0	0.0	54.92





A12

SAMPLE NUMBER N601

OXIDE	WT PCT	MOLE PCT	NORMATIVE MINERALS	WT PCT	MOLE PCT
SiO2	62.47	71.34	KS	0.0	0.0
TiO2	0.87	0.75	KP	0.0	0.0
Al2O3	16.55	11.11	LC	0.0	0.0
Fe2O3	4.88	2.09	NS	0.0	0.0
FeO	0.0	0.0	OR	16.78	5.60
MnO	2.00	0.0	AB	34.10	12.07
MgO	3.93	3.39	AN	18.68	12.47
CaO	4.03	4.79	NE	0.0	0.0
Na2O	2.84	4.45	Q	17.13	52.95
K2O	0.0	2.06	OL	0.0	0.0
R2O5	0.0	0.0	FB	0.0	0.0
BaO	0.0	0.0	FA	0.0	0.0
SmO	0.0	0.0	LN	0.0	0.0
Cr2O3	0.0	0.0	MY	4.98	9.21
F	0.0	0.0	EN	4.98	9.21
Cl	0.0	0.0	FS	0.0	0.0
S03	0.0	0.0	OT	0.0	0.0
S	0.0	0.0	WD	0.0	0.0
CO2	0.0	0.0	EN	0.0	0.0
ZnO2	0.0	0.0	FS	0.0	0.0
			WD	0.0	0.0
			AC	0.0	0.0
			AP	0.0	0.0
			TI	0.0	0.0
			SP	0.57	0.34
			RU	0.64	1.48
			PV	0.0	0.0
			C	0.0	0.0
			MY	0.0	0.0
			HEM	4.88	5.67
			CH	0.0	0.0
			HL	0.0	0.0
			FR	0.0	0.0
			TH	0.0	0.0
			PR	0.0	0.0
			NC	0.0	0.0
			CC	0.0	0.0
			Z	0.0	0.0

97.77

PETROLOGIC VALUES: (IN MOLE PCT UNLESS INDICATED AS WT PCT BY W)

RATIOS	W	MOLE PCT	UNLESS INDICATED AS WT PCT BY W)
KUMD SI	28.292	48.60	PLAG
KUMD SI	14.545	35.79	NE
PCLDERVAART	24.346	15.61	OL
COOMBS	0.540	65.74	HY
LARSEN	16.629	0.0	Q
THORNTON II	0.0	34.28	CPX
THORNTON DI	70.620	33.75	NE
CI	17.077	23.81	OL
AL2O3/SIO2	0.156	42.44	HY
FENG	39.120	0.0	Q
FE2/FE3	0.0	0.0	
NA + K	6.511	19.47	
NA + K/A	0.586	80.53	
AL2/SI6	0.030	0.0	A/MG
			1.92

GRANITE TETRAMEDRON-W-

OR	16.78	24.13	24.68	31.91	19.36
AB	34.10	49.02	50.14	0.0	0.0
AN	18.68	26.86	0.0	48.77	0.0
Q	17.13	0.0	25.19	26.72	35.57
PLAG	0.0	0.0	0.0	24.56	32.57
			0.0	0.0	19.76
			0.0	0.0	60.88

A13

SAMPLE NUMBER N602

OXIDE	WT PCT	MOLE PCT	NORMATIVE MINERALS	WT PCT	MOLE PCT
SiO2	69.78	78.07	KS	0.0	0.0
TiO2	0.46	0.39	KP	0.0	0.0
Al2O3	15.40	10.15	LC	0.0	0.0
Fe2O3	2.20	0.93	NS	0.0	0.0
FED	0.0	0.0	NR	23.34	6.22
MnO	0.0	0.0	AB	28.01	7.92
MgO	0.70	1.17	AN	11.96	6.38
CaO	2.41	2.89	NE	0.0	0.0
Na2O	3.31	3.59	Q	29.20	72.11
K2O	3.95	2.82	OL	0.0	0.0
P2O5	0.0	0.0	FD	0.0	0.0
BaO	0.0	0.0	FA	0.0	0.0
SrO	0.0	0.0	LN	0.0	0.0
CR2O3	0.0	0.0	HY	1.74	2.58
F	0.0	0.0	EN	1.74	2.58
CL	0.0	0.0	FS	0.0	0.0
SO3	0.0	0.0	DI	0.0	0.0
S	0.0	0.0	MO	0.0	0.0
CO2	0.0	0.0	FN	0.0	0.0
ZRO2	0.0	0.0	FS	0.0	0.0
			MO	0.0	0.0
			AC	0.0	0.0
			AP	0.0	0.0
			IL	0.0	0.0
			SP	0.0	0.0
			RU	0.46	0.85
			PV	0.0	0.0
			C	1.30	1.89
			MT	0.0	0.0
			HEM	2.20	2.04
			CH	0.0	0.0
			HL	0.0	0.0
			FR	0.0	0.0
			TH	0.0	0.0
			PR	0.0	0.0
			NC	0.0	0.0
			CC	0.0	0.0
			Z	0.0	0.0

98.21

98.21

PETROLOGIC VALUES: (IN MOLE PCT UNLESS INDICATED AS WT PCT BY W)		TRIANGULAR PLOTS		BASALT TETRAM' RON	
WATIOS		A	62.69	PLAG	16.07
KUNO SI W	13.727	C	28.26	NE	0.0
KUNO SI	6.890	F	9.06	OL	0.0
POLDERVAART	2.594	A	84.59	HY	2.90
COOMBS	0.509	F	0.0	Q	81.03
LARSEN	23.376	M	15.41		0.0
THORNTON II	1.889	ALK	45.10	CPX	0.0
THORNTON OI	86.259	AL	26.35	NE	0.0
CI	7.665	CFM	28.54	OL	0.0
AL2O3/SIO2	4.243		0.0	HY	3.45
FEMG	0.0	II	1.97	Q	96.55
FE2/FE3	6.409	DI	8.00		0.0
NA + K	0.631	CI	90.03		0.0
NA + K/A	0.027			A/MG	5.49
AL2/SI6					0.0

GRANITE TETRAHEDRON-W-

OR	23.34	36.87	28.98	0.0	36.19	25.23
AB	28.01	44.24	34.77	40.50	0.0	0.0
AN	11.96	18.89	0.0	17.29	18.54	0.0
Q	29.20	0.0	36.25	42.22	45.27	31.56
PLAG	0.0	0.0	0.0	0.0	0.0	43.20

A14

SAMPLE NUMBER NA25

OXIDE	WT PCT	WLF PCT	NORMATIVE MINERALS	WT PCT	MOLE PCT
SiO2	68.51	76.21	KS	0.0	0.0
TiO2	0.25	0.21	KP	0.0	0.0
Al2O3	15.62	10.24	LC	0.0	0.0
Fe2O3	2.57	1.08	NS	0.0	0.0
FeO	0.0	0.0	OR	25.12	7.73
MnO	0.0	0.0	AR	30.55	9.98
MgO	0.94	1.39	AM	13.87	8.54
CaO	3.38	3.97	NE	0.0	0.0
Na2O	3.61	3.99	Q	23.45	66.88
K2O	4.25	3.01	OL	0.0	0.0
P2O5	0.0	0.0	FO	0.0	0.0
BaO	0.0	0.0	FA	0.0	0.0
SrO	0.0	0.0	LW	0.0	0.0
Cr2O3	0.0	0.0	HY	1.45	2.47
F	0.0	0.0	EM	1.48	2.47
Cl	0.0	0.0	FS	0.0	0.0
Sn3	0.0	0.0	DI	1.39	1.10
S	0.0	0.0	MO	0.74	0.55
CO2	0.0	0.0	CB	0.44	0.55
ZrO2	0.0	0.0	FS	0.0	0.0
			MO	0.0	0.0
			AC	0.0	0.0
			AP	0.0	0.0
			IL	0.0	0.0
			IL	0.0	0.0
			SP	0.61	8.54
			RU	0.0	0.0
			PV	0.0	0.0
			C	0.0	0.0
			MT	0.0	0.0
			HEM	2.57	2.76
			CH	0.0	0.0
			ML	0.0	0.0
			FR	0.0	0.0
			TH	0.0	3.0
			PR	0.0	0.0
			NC	0.0	0.0
			CC	0.0	0.0
			Z	0.0	0.0

99.00

PETROLOGIC VALUES: (1M MOLE PCT UNLESS INDICATED AS WT PCT BY M)

MINERAL	WT PCT	MOLE PCT	MINERAL	WT PCT	MOLE PCT
PLAG	57.80	21.00	PLAG	21.00	21.00
NE	39.20	0.0	NE	0.0	0.0
GL	9.00	0.0	GL	0.0	0.0
HY	63.23	2.81	HY	2.81	2.81
Q	0.0	76.11	Q	76.11	76.11
CPR	16.77	0.0	CPR	0.0	0.0
ALK	44.28	1.56	ALK	1.56	1.56
ME	28.95	0.0	ME	0.0	0.0
OL	34.37	0.0	OL	0.0	0.0
HY	0.0	3.51	HY	3.51	3.51
Q	0.0	94.93	Q	94.93	94.93
DI	11.10	0.0	DI	0.0	0.0
CB	68.61	0.0	CB	0.0	0.0
Z	0.0	4.96	Z	4.96	4.96

99.00

GRAMITE TETRAHEDRON-M-

MINERAL	WT PCT	MOLE PCT
OR	25.12	36.12
AB	30.55	43.93
AM	13.87	19.94
Q	23.45	0.0
PLAG	0.0	0.0

MINERAL	WT PCT	MOLE PCT
OR	40.23	0.0
AB	0.0	0.0
AM	22.21	0.0
Q	37.56	25.22
PLAG	0.0	47.77

MINERAL	WT PCT	MOLE PCT
OR	0.0	0.0
AB	45.01	0.0
AM	20.43	0.0
Q	34.55	0.0
PLAG	0.0	0.0

A15

SAMPLE NUMBER: M605

OXIDE	WT PCT	MOLE PCT	NORMATIVE MINERALS	WT PCT	MOLE PCT
SiO2	61.55	72.57	KC	0.0	0.0
TiO2	0.66	0.59	KP	0.0	0.0
Al2O3	16.14	11.22	LC	0.0	0.0
Fe2O3	4.73	7.10	NS	0.0	0.0
FeO	0.0	0.0	OR	19.62	6.57
MnO	0.0	0.0	AH	28.94	10.29
MgO	1.07	1.88	AN	18.88	12.66
CaO	4.15	5.24	NE	0.0	0.0
Na2O	3.42	3.91	O	18.83	58.45
K2O	3.32	2.50	OL	0.0	0.0
P2O5	0.0	0.0	FO	0.0	0.0
BaO	0.0	0.0	FA	0.0	0.0
SRD	0.0	0.0	LN	0.0	0.0
CR2O3	0.0	0.0	HV	2.66	4.95
F	0.0	0.0	EN	2.66	4.95
CL	0.0	0.0	FS	0.0	0.0
SO3	0.0	0.0	OT	0.0	0.0
S	0.0	0.0	WO	0.0	0.0
CO2	0.0	0.0	EN	0.0	0.0
ZrO2	0.0	0.0	FS	0.0	0.0
			WO	0.0	0.0
			AC	0.0	0.0
			AP	0.0	0.0
			IL	0.0	0.0
			SP	1.20	1.14
			RU	0.17	0.40
			PV	0.0	0.0
			F	0.0	0.0
			MT	0.0	0.0
			HEM	4.73	5.53
			CH	0.0	0.0
			HL	0.0	0.0
			FR	0.0	0.0
			TH	0.0	0.0
			PR	0.0	0.0
			MC	0.0	0.0
			CC	0.0	0.0
			Z	0.0	0.0

95.04

95.04

PETROLOGIC VALUES: (IN MOLE PCT UNLESS INDICATED AS WT PCT BY W)

RATIOS	WT PCT	MOLE PCT	MINERAL	WT PCT	MOLE PCT
KUNO SI W	18.105		PLAG	26.58	
KUNO SI C	8.533		NE	0.0	
POLDERVAART	23.720		OL	0.0	
CCOMBS	0.520		HY	5.73	
LARSEN	18.316		Q	67.69	
THORNTON II	0.0		CPX	0.0	
THORNTON DI	75.322		NE	0.0	
CI	15.137		OL	0.0	
AL2O3/SIO2	0.155		HY	7.81	
FEMG	52.743		Q	92.19	
FE2/FE3	0.0			0.0	
NA + K	6.406			0.0	
NA + K/A	0.571			0.0	
AL2/SI6	0.029			0.0	

GRANITE TETRAHEDRON-W	WT PCT	MOLE PCT
OR	19.62	29.09
AB	28.94	42.91
AN	18.88	28.00
Q	18.83	0.0
PLAG	0.0	0.0

GRANITE TETRAHEDRON-W	WT PCT	MOLE PCT
OR	34.22	22.74
AB	0.0	0.0
AN	32.94	0.0
Q	32.84	21.83
PLAG	0.0	55.43



A17

SAMPLE NUMBER N612

OXIDE	WT PCT	MOLE PCT	NORMATIVE MINERALS	WT PCT	MOLE PCT
SiO2	59.68	67.22	KS	0.0	0.0
TiO2	0.24	0.71	KP	0.0	0.0
Al2O3	15.95	10.59	LC	0.0	0.0
Fe2O3	7.13	3.02	VS	0.0	0.0
FeO	0.0	0.0	DR	26.00	10.50
MnO	0.0	0.0	AB	29.60	12.26
MgO	2.99	5.02	AN	15.36	12.41
CaO	5.46	6.59	NF	0.0	0.0
Na2O	3.58	3.69	Q	9.56	35.75
K2O	4.40	3.16	DL	0.0	0.0
P2O5	0.0	0.0	FN	0.0	0.0
RAO	0.0	0.0	FA	0.0	0.0
SR0	0.0	0.0	LN	0.0	0.0
CR2O3	0.0	0.0	HY	4.27	9.56
F	0.0	0.0	EN	4.27	9.56
CL	0.0	0.0	FS	0.0	0.0
SO3	0.0	0.0	DI	6.86	7.12
S	0.0	0.0	WO	3.68	3.56
CO2	0.0	0.0	EN	3.18	3.56
ZRO2	0.0	0.0	FS	0.0	0.0
			MO	0.0	0.0
			AC	0.0	0.0
			AP	0.0	0.0
			TL	0.0	0.0
			SP	2.06	2.36
			RU	0.0	0.0
			PV	0.0	0.0
			C	0.0	0.0
			MT	0.0	0.0
			HFM	7.13	10.04
			CH	0.0	0.0
			HL	0.0	0.0
			ER	0.0	0.0
			TH	0.0	0.0
			PR	0.0	0.0
			NC	0.0	0.0
			CC	0.0	0.0
			Z	0.0	0.0

99.83

PETROLOGIC VALUES: (IN MOLE PCT UNLESS INDICATED AS WT PCT BY W)

RATIOS	WT PCT	MOLE PCT	MINERAL	WT PCT	MOLE PCT
KUNO SI W	33.701	41.62	A	0.0	0.0
KUNO SI H	16.704	40.03	C	0.0	0.0
POLDERVAAPT	20.242	18.35	F	0.0	0.0
COOMBS	0.494	57.72	A	13.66	21.95
LARSEN	12.378	0.0	F	51.09	0.0
THORNTON II	1.779	0.0	M	0.0	0.0
THORNTON DI	58.516	30.87	ALK	17.58	0.0
CI	0.158	22.525	AL	0.0	0.0
AL2O3/SIO2	37.580	52.30	CFM	0.0	0.0
FEMG	0.0	0.0	IT	2.15	0.0
FEZ/FE3	6.852	27.20	DI	68.20	0.0
NA + K	0.647	70.65	CI	0.0	0.0
NA + K/A	0.034	0.0	A/MG	1.37	0.0
AL2/SI6					

99.83

GRANITE TETRAHEDRON-W-

OR	WT PCT	MOLE PCT	GRANITE TETRAHEDRON-W-	WT PCT	MOLE PCT
DR	26.00	37.17	DR	40.53	51.07
AB	28.60	40.88	AB	53.45	0.0
AN	15.36	21.95	AN	28.70	30.16
Q	9.56	0.0	Q	17.86	18.77
PLAG	0.0	0.0	PLAG	0.0	0.0

32.70  
0.0  
0.0  
12.02  
55.28

A18

SAMPLE NUMBER MS16

OXIDE	WT PCT	VOL% PCT	MPOXATIVE MINERALS	WT PCT	MG/L PCT
SiO2	58.81	58.24	MS	0.0	0.0
TiO2	1.14	1.02	KF	0.0	0.0
AL2O3	15.52	10.48	LC	0.0	0.0
FE2O3	10.58	4.56	NS	0.0	0.0
FeO	0.0	0.0	OR	12.82	5.68
MNO	0.0	0.0	AR	24.79	11.66
MGO	5.36	9.16	AN	22.79	20.21
CAO	9.52	11.59	NE	0.0	0.0
NA2O	2.93	3.26	O	2.35	9.65
K2O	2.17	1.59	OH	0.0	0.0
P2O5	0.0	0.0	FD	0.0	0.0
RAO	0.0	0.0	FA	0.0	0.0
SRO	0.0	0.0	LN	0.0	0.0
CR2O3	0.0	0.0	HY	6.01	14.77
F	0.0	0.0	EM	6.01	14.77
CL	0.0	0.0	FS	0.0	0.0
SM3	0.0	0.0	OT	15.83	18.03
S	0.0	0.0	MO	8.49	9.02
CO2	0.0	0.0	EM	7.34	9.02
ZRO2	0.0	0.0	FS	0.0	0.0
			VJ	0.0	0.0
			AC	0.0	0.0
			AP	0.0	0.0
			IL	0.0	0.0
			EL	0.0	0.0
			SP	2.90	3.64
			RU	0.0	0.0
			PV	0.0	0.0
			C	0.0	0.0
			MT	0.0	0.0
			HEM	10.58	16.35
			CH	0.0	0.0
			HL	0.0	0.0
			FR	0.0	0.0
			TH	0.0	0.0
			PR	0.0	0.0
			NC	0.0	0.0
			CC	0.0	0.0
			Z	0.0	0.0

98.07

PETROLOGIC VALUES: (IN MOLE PCT UNLESS INDICATED AS WT PCT BY W)

RATIOS	W	W	W	W	W
KUNO SI	49.328	A	22.95	PLAG	56.62
KUNO ST	25.475	C	55.42	NE	0.0
POLDERVAART	1.021	E	21.63	OL	0.0
COOMBS	0.400	A	34.59	HY	26.24
LARSEN	-0.642	F	0.0	Q	17.14
THORNTON II	4.508	M	65.41	CPX	0.0
THORNTON DI	26.999	ALK	15.46	NE	0.0
CI	41.118	AL	16.01	OL	0.0
AL2O3/SIO2	0.180	CFM	66.54	HY	34.79
FEMG	33.260	II	0.0	O	22.73
FE2/FE3	0.0	DI	6.21	0	0.0
NA + K	4.843	CI	56.62	0.0	0.0
NA + K/A	0.462	CI	37.18	0.0	0.0
AL2/SI6	0.028		0.0	A/MG	0.53

98.07

GRANITE TETRAMEDRON-W-

OR	WT PCT	MG/L PCT
OR	12.82	21.23
AB	24.79	41.04
AN	22.79	37.73
Q	2.35	0.0
PLAG	0.0	0.0

98.07

OR	WT PCT	MG/L PCT
OR	12.82	21.23
AB	24.79	41.04
AN	22.79	37.73
Q	2.35	0.0
PLAG	0.0	0.0



A19

SAMPLE NUMBER NA17

OXIDE	WT PCT	MOL PCT	RELATIVE MINERALS	WT PCT	MOL PCT
SiO2	51.01	58.37	KS	0.0	0.0
TiO2	2.19	1.98	KP	0.0	0.0
Al2O3	15.33	10.34	LC	0.0	0.0
Fe2O3	10.84	4.67	NS	0.0	0.0
FeO	0.0	0.0	DR	14.83	6.42
MnO	0.0	0.0	AR	25.13	11.54
MgO	5.20	8.87	AN	21.09	18.25
CaO	8.76	10.74	NE	0.0	0.0
Na2O	2.97	3.29	Q	2.44	9.77
K2O	2.51	1.83	QL	0.0	0.0
P2O5	0.0	0.0	FG	0.0	0.0
BaO	0.0	0.0	FA	0.0	0.0
SrO	0.0	0.0	LN	0.0	0.0
Cr2O3	0.0	0.0	HY	7.63	18.29
F	0.0	0.0	FN	7.63	18.29
Cl	0.0	0.0	FS	0.0	0.0
SO3	0.0	0.0	WT	11.48	12.77
S	0.0	0.0	WO	6.16	6.38
CO2	0.0	0.0	EN	5.32	6.38
ZrO2	0.0	0.0	ES	0.0	0.0
			MD	0.0	0.0
			AC	0.0	0.0
			AP	0.0	0.0
			IL	0.0	0.0
			SP	9.0	6.60
			PIJ	0.0	0.0
			PV	0.0	0.0
			C	0.0	0.0
			MT	0.0	0.0
			HEM	10.85	16.36
			CH	0.0	0.0
			HL	0.0	0.0
			FR	0.0	0.0
			TH	0.0	0.0
			PR	0.0	0.0
			NC	0.0	0.0
			CC	0.0	0.0
			Z	0.0	0.0

98.82

PETROLOGIC VALUES: (IN MOL FCT UNLESS INDICATED AS WT PCT BY W)

RATIOS	W	TRANGULAR PLOTS	RASALT TETRAHEDRON
KUNO SI M	47.507	A 24.96	FLAG 51.50
KUNO SI	24.152	C 52.29	NE 0.0
POLDERVAART	10.192	F 22.74	OL 0.0
COOMBS	0.493	A 36.63	HY 31.62
LARSEN	0.764	F 0.0	Q 16.88
THORNTON II	3.191	M 43.37	0.0
THORNTON DI	27.724	ALK 17.12	CPX 31.27
CI	0.177	AL 17.40	NE 0.0
AL2O3/SIO2	34.503	CFM 65.68	OL 0.0
FENG	0.0	0.0	HY 44.81
FE2/FE1	5.127	TI 4.70	23.92
NA + K	0.496	DI 54.44	0.0
NA + K/A	0.496	CI 40.84	0.0
AL2/SI6	0.496	0.0	A/MG 0.58

98.82

GRANITE TETRAHEDRON-W-  
 OR 14.83 24.30  
 AB 25.13 41.16  
 AN 21.09 34.54  
 Q 2.44 0.0  
 PLAG 0.0 0.0  
 0.0 38.67 23.36  
 51.65 0.0  
 43.34 0.0  
 6.35 3.84  
 0.0 72.80

A20

SAMPLE NUMBER MAJOR

OXIDE	WT PCT	MOLE PCT	NORMATIVE MINERALS	WT PCT	MOLE PCT
SiO2	58.09	48.57	KS	0.0	0.0
TiO2	2.07	1.84	KP	0.0	0.0
Al2O3	15.77	10.00	LC	0.0	0.0
Fe2O3	5.63	4.24	NS	0.0	0.0
FeO	0.0	0.0	UR	14.54	4.08
MnO	0.0	0.0	AB	20.65	6.14
MgO	1.92	3.38	AN	24.21	13.58
CaO	4.88	6.14	NE	0.0	0.0
Na2O	2.44	2.80	Q	21.16	54.97
K2O	2.46	1.96	HL	0.0	0.0
BaO	0.0	0.0	FA	0.0	0.0
SrO	0.0	0.0	LN	0.0	0.0
Cr2O3	0.0	0.0	HY	4.78	7.43
F	0.0	0.0	FM	4.78	7.43
CL	0.0	0.0	FS	0.0	0.0
Sr3	0.0	0.0	DE	0.0	0.0
S	0.0	0.0	WD	0.0	0.0
C02	0.0	0.0	EM	0.0	0.0
ZrO2	0.0	0.0	FS	0.0	0.0
			WD	0.0	0.0
			AC	0.0	0.0
			AP	0.0	0.0
			EL	0.0	0.0
			SP	0.0	0.0
			RU	2.07	4.04
			PV	0.0	0.0
			C	0.22	0.14
			MT	0.0	0.0
			HEM	9.63	9.41
			CH	0.0	0.0
			ML	0.0	0.0
			FR	0.0	0.0
			TH	0.0	0.0
			PR	0.0	0.0
			NC	0.0	0.0
			CC	0.0	0.0
			Z	0.0	0.0

97.26

PETROLOGIC VALUES: (IN MOLE PCT UNLESS INDICATED AS WT PCT BY W)

RATIO	WT PCT	MOLE PCT	TRANGULAR PLOTS	BASALT TETRAMEDRON	GRANITE TETRAMEDRON-W
KUMD SI M	27.662	30.77	A	PLAG	24.02
KUMD SI	11.672	40.89	C	NE	0.0
POLDERVAART	11.282	78.34	F	OL	0.0
COOMBS	0.532	57.90	F	HV	9.05
LARSEN	14.254	0.0	F	Q	46.93
THORNTON II	0.336	42.10	M	Q	0.0
THORNTON OI	65.190	22.63	ALK	CPR	0.0
CI	17.299	30.83	AL	NE	0.0
AL2O3/SIO2	0.16C	44.54	CFM	OL	0.0
FENG	55.875	0.0		HV	11.01
FEZ/FE3	0.0	0.41	II	Q	88.09
NA + K	4.652	20.89	DI		0.0
NA + K/A	0.423	78.71	CI	A/MG	0.0
AL2/SI6	0.023	0.0			1.39

97.76

A21

SAMPLE NUMBER 1

OXIDE	WT PCT	MOLE PCT	NORMATIVE MINERALS	WT PCT	MOLE PCT
SiO2	58.50	68.28		0.0	0.0
TiO2	1.13	0.99	KS	0.0	0.0
Al2O3	15.70	10.80	LC	0.0	0.0
Fe2O3	2.52	1.11	NS	0.0	0.0
FeO	5.04	4.92	OR	1.48	0.37
MnO	0.04	0.04	AR	23.69	6.34
MgO	2.85	4.95	AN	22.03	11.12
CaO	4.44	5.55	NE	0.0	0.0
Na2O	2.80	3.17	Q	25.04	58.52
K2O	0.25	0.19	PL	0.0	0.0
P2O5	0.0	0.0	FO	0.0	0.0
RO	0.0	0.0	FA	0.0	0.0
SRO	0.0	0.0	LN	0.0	0.0
CR2O3	0.0	0.0	HY	12.48	15.65
F	0.0	0.0	EM	7.10	9.93
CL	0.0	0.0	FS	5.38	5.73
SO3	0.0	0.0	DI	0.0	0.0
S	0.0	0.0	WD	0.0	0.0
CO2	0.0	0.0	EN	0.0	0.0
ZRO2	0.0	0.0	FS	0.0	0.0
			WD	0.0	0.0
			AC	0.0	0.0
			AP	0.0	0.0
			IL	2.15	1.99
			SP	0.0	0.0
			RU	0.0	0.0
			PV	0.0	0.0
			C	2.75	3.79
			MT	3.65	2.22
			HEM	0.0	0.0
			CH	0.0	0.0
			HL	0.0	0.0
			FR	0.0	0.0
			TH	0.0	0.0
			PR	0.0	0.0
			NC	0.0	0.0
			CC	0.0	0.0
			Z	0.0	0.0

93.27

PETROLOGIC VALUES: (IN MOLE PCT UNLESS INDICATED AS WT PCT BY W)

RATIOS	WT PCT	MOLE PCT	TRANGULAR PLOTS	WT PCT	MOLE PCT
KUMD SI H	34.575	A	22.46	PLAG	19.05
KUMD SI	21.174	C	37.18	NE	0.0
POLDERVAART	1.770	F	40.35	OL	0.0
COOMBS	0.539	A	25.35	HY	17.08
LARSEN	12.342	F	37.18	O	63.86
THORNTON II	11.732	M	37.47		0.0
THORNTON DI	65.238	ALK	12.79	CPX	0.0
CI	16.081	AL	28.38	NE	0.0
AL2O3/SiO2	0.158	CFM	58.83	DL	0.0
FENG	54.866		0.0	HY	21.10
FE2/FE1	81.636	II	12.61	Q	78.90
NA + K	3.354	DI	17.28		0.0
NA + K/A	0.311	CI	70.11		0.0
AL2/Si6	0.016		0.0	A/MG	0.68

GRANITE TETRAHEDRON-W-

OR	1.48	3.13
AB	23.69	50.20
AN	22.03	46.67
Q	25.04	0.0
PLAG	0.0	0.0
	2.94	2.05
	47.19	0.0
	0.0	33.46
	0.0	31.13
	49.87	45.37
	0.0	51.58
	0.0	0.0
	0.0	63.29

A22

SAMPLE NUMBER 2

OXIDE	WT PCT	MOLE PCT	NORMATIVE MINERALS	WT PCT	MOLE PCT
SiO2	67.92	74.44	KS	0.0	0.0
TiO2	0.59	0.49	KD	0.0	0.0
Al2O3	15.16	5.78	LC	0.0	0.0
Fe2O3	1.10	0.44	NS	0.0	0.0
FeO	2.38	2.18	OR	20.80	6.16
MnO	0.10	0.09	AR	31.31	9.84
MgO	1.47	2.40	AN	14.36	8.51
CaO	3.23	3.79	NE	0.0	0.0
Na2O	3.70	3.93	O	23.18	63.62
K2O	1.52	2.44	UL	0.0	0.0
P2O5	0.14	0.06	FN	0.0	0.0
ROD	0.0	0.0	FA	0.0	0.0
SR0	0.0	0.0	LM	0.0	0.0
CR2O3	0.0	0.0	HV	5.96	8.81
F	0.0	0.0	EN	3.48	5.72
CL	0.0	0.0	FS	2.47	3.09
SO3	0.0	0.0	DI	0.62	0.45
S	0.0	0.0	MO	0.32	0.22
CO2	0.0	0.0	FN	0.18	0.15
ZRO2	0.0	0.0	FS	0.13	0.08
			MO	0.0	0.0
			AC	0.0	0.0
			AP	0.33	0.16
			TL	1.12	1.22
			SP	0.0	0.0
			RU	0.0	0.0
			PV	0.0	0.0
			C	0.0	0.0
			NT	1.73	1.23
			HEM	0.0	0.0
			CH	0.0	0.0
			HL	0.0	0.0
			FR	0.0	0.0
			TH	0.0	0.0
			PR	0.0	0.0
			NC	0.0	0.0
			CC	0.0	0.0
			Z	0.0	0.0

99.40

99.40

PETROLOGIC VALUES: (IN MOLE PCT UNLESS INDICATED AS WT PCT BY W)

RATIOS	WT PCT	MOLE PCT	TRIANGULAR PLOTS	WT PCT	MOLE PCT
KUNO SI M	20.941	A	49.72	PLAG	20.22
KUNO SI W	11.990	C	29.50	NE	0.0
POLDERVAART	20.799	F	20.78	DL	0.0
COOMBS	0.520	A	58.24	HY	9.71
LARSEN	19.823	F	19.88	Q	70.07
THORNTON II	4.673	M	21.88	CPX	0.0
THORNTON DI	79.620	ALK	35.18	NE	0.0
CI	11.130	AL	18.71	DL	0.0
AL2O3/SIO2	0.132	CFM	46.10	HY	12.09
FEMG	52.673	II	4.87	Q	87.29
FE2/FE3	81.636	DI	12.12	0.0	0.0
NA + K	6.384	CI	83.00	A/MG	2.66
NA + K/A	0.653	0.0	0.0		
AL2/SIO6	0.029	0.0	0.0		

GRANITE TETRAHEDRON-W

	OR	AB	AN	Q	PLAG
20.80	31.29	27.63	0.0	35.65	23.20
31.31	47.10	41.58	0.0	0.0	0.0
14.36	21.61	0.0	20.86	45.47	0.0
23.18	0.0	30.79	39.73	24.67	25.86
0.0	0.0	0.0	0.0	33.67	50.94
0.0	0.0	0.0	0.0	0.0	0.0

A23

SAMPLE NUMBER 3

OXIDE	WT PCT	MOLE PCT	NORMATIVE MINERALS	WT PCT	MOLE PCT
SiO2	74.02	70.35	KS	0.0	0.0
TiP2	0.33	0.27	KD	0.0	0.0
Al2O3	14.88	9.40	LC	0.0	0.0
Fe2O3	0.71	0.29	NS	0.0	0.0
FeO	1.42	1.27	DR	28.25	8.20
MnO	0.06	0.05	AR	37.99	11.71
MgO	0.27	0.43	AN	4.01	2.33
CaO	0.86	0.99	NE	0.0	0.0
Na2O	4.49	4.67	Q	26.75	71.95
K2O	4.78	3.27	DL	0.0	0.0
P2O5	0.04	0.02	FO	0.0	0.0
SiO	0.0	0.0	FA	0.0	0.0
SiO2	0.0	0.0	LN	0.0	0.0
CR2O3	0.0	0.0	HY	2.26	3.03
F	0.0	0.0	EN	0.67	1.08
CL	0.0	0.0	FS	1.59	1.94
SO3	0.0	0.0	DT	0.0	0.0
S	0.0	0.0	WO	0.0	0.0
CO2	0.0	0.0	FM	0.0	0.0
ZRO2	0.0	0.0	FS	0.0	0.0
			WO	0.0	0.0
			AC	0.0	0.0
			AP	0.09	0.05
			IL	0.63	0.67
			SP	0.0	0.0
			RU	0.0	0.0
			PV	0.0	0.0
			C	0.85	1.35
			MT	1.03	0.72
			HEM	0.0	0.0
			CH	0.0	0.0
			HL	0.0	0.0
			FR	0.0	0.0
			TH	0.0	0.0
			PR	0.0	0.0
			NC	0.0	0.0
			CC	0.0	0.0
			Z	0.0	0.0

101.86

101.86

PETROLOGIC VALUES: (IN MOLE PCT UNLESS INDICATED AS WT PCT BY WJ)

RATIOS	WT PCT	MOLE PCT	TRIANGULAR PLOTS	BASALT TETRAHEDRON	GRANITE TETRAHEDRON-W-
KUNO S1 M	4.34	75.70	A	PLAG	OR
KUNO S1	2.314	9.42	C	NE	AB
PCLDERVAART	34.310	14.88	F	DL	AN
COOMBS	0.504	82.32	A	HY	Q
LARSEN	26.664	13.21	F	Q	PLAG
THORNTON II	4.059	4.47	M	0	
THORNTON DI	91.863	65.62	ALK	CPX	
CI	2.869	12.12	AL	NE	
AL2O3/SiO2	0.118	22.24	(CFM)	DL	
FEMF	78.333	0.0	II	HY	
FE2/FE3	81.636	4.11	DI	Q	
NA + K	7.935	2.90	CI	95.96	
NA + K/A	0.844	92.99		0.0	
AL2/Si6	0.033	0.0	A/MG	18.40	

OR	28.25	40.21	30.38	47.87	29.12
AB	37.99	54.08	40.86	0.0	0.0
AN	4.01	5.71	0.0	0.0	0.0
Q	26.75	0.0	28.77	45.33	27.58
PLAG	0.0	0.0	0.0	0.0	43.30

A24

SAMPLE NUMBER 4

OXIDE	WT PCT	MOLE PCT	NORMATIVE MINERALS	WT PCT	MOLE PCT
SiO2	64.64	73.69	KS	0.0	0.0
TiO2	0.56	0.56	KP	0.0	0.0
Al2O3	15.85	10.60	LC	0.0	0.0
Fe2O3	1.44	0.71	NS	0.0	0.0
FeO	3.32	3.15	OP	19.27	6.26
MnO	0.01	0.01	AR	32.24	11.11
MgO	0.14	0.07	AN	16.52	10.73
CaO	3.70	0.07	NE	0.0	0.0
Na2O	3.81	4.00	O	20.91	62.89
K2O	3.26	2.00	OL	0.0	0.0
P2O5	0.0	0.0	FD	0.0	0.0
BAC	0.0	0.0	FA	0.0	0.0
SMO	0.0	0.0	LN	0.0	0.0
CR2O3	0.0	0.0	SM	0.0	0.0
F	0.0	0.0	HY	3.15	4.44
CL	0.0	0.0	EM	0.27	0.49
SP3	0.0	0.0	ES	2.88	3.95
S	0.0	0.0	DI	1.61	1.19
CO2	0.0	0.0	WO	0.77	0.60
PRO2	0.0	0.0	EN	0.07	0.07
			FS	0.77	0.53
			WO	0.0	0.0
			AC	0.0	0.0
			AP	0.0	0.0
			IL	1.25	1.49
			SP	0.0	0.0
			RU	0.0	0.0
			PV	0.0	0.0
			C	0.0	0.0
			HT	2.41	1.88
			HEM	0.0	0.0
			CH	0.0	0.0
			ML	0.0	0.0
			FR	0.0	0.0
			TH	0.0	0.0
			PR	0.0	0.0
			NC	0.0	0.0
			CC	0.0	0.0
			Z	0.0	0.0

97.36

97.36

PETROLOGIC VALUES: (IN MOLE PCT UNLESS INDICATED AS WT PCT BY W)

RATIO	W	SI	W	TRANGULAR PLOTS	WT PCT BY W	MOLE PCT BY W
KUND SI	2.224	A	43.94	PLAG	24.50	28.32
KUND SI	1.148	C	30.17	NE	0.0	0.0
POLDERVAART	27.408	F	25.09	OL	0.0	47.39
COOMBS	0.499	A	65.92	HY	4.98	24.28
LARSEN	21.007	F	31.70	O	70.52	0.0
THORNTON II	6.654	H	2.38		0.0	0.0
THORNTON DI	80.260	ALK	35.44	CPIX	1.74	0.0
CI	0.144	AL	21.90	NE	0.0	0.0
FFMG	94.220	CFM	42.66	OL	0.0	0.0
FE2/FE3	81.636	II	6.77	HY	6.48	0.0
NA + K	6.550	DI	11.55	O	91.78	0.0
NA + K/A	0.618	CI	81.68		0.0	0.0
AL2/SI6	0.030		0.0	A/MG	27.67	0.0

GRANITE TETRAHEDRON-W-

OR	WT PCT	MOLE PCT
OR	19.27	28.32
AB	32.24	47.39
AN	16.52	24.28
O	20.91	0.0
PLAG	0.0	0.0

A25

SAMPLE NUMBERS 5

OXIDE	WT PCT	MOLF PCT	NORMATIVE MINERALS	WT PCT	MOLF PCT
SiO2	66.42	74.24	KS	0.0	0.0
TiO2	0.56	0.47	KP	0.0	0.0
Al2O3	16.39	10.40	IC	0.0	0.0
Fe2O3	1.01	0.43	NS	0.0	0.0
FeO	2.03	1.90	OR	20.09	6.62
MnO	0.06	0.06	AB	37.32	13.06
MgO	0.90	1.50	AN	12.80	8.45
CaO	2.75	3.30	NE	0.0	0.0
Na2O	4.41	4.78	Q	19.94	60.89
K2O	3.40	2.43	DL	0.0	0.0
P2O5	0.13	0.06	FO	0.0	0.0
BaO	0.0	0.0	FA	0.0	0.0
SrO	0.0	0.0	LN	0.0	0.0
Cr2O3	0.0	0.0	HY	4.32	6.99
F	0.0	0.0	FN	2.24	4.10
Cl	0.0	0.0	FS	2.08	2.89
S	0.0	0.0	DI	0.0	0.0
SO3	0.0	0.0	MO	0.0	0.0
CO2	0.0	0.0	EN	0.0	0.0
ZrO2	0.0	0.0	FS	0.0	0.0
			MD	0.0	0.0
			AC	0.0	0.0
			AP	0.30	0.17
			IL	1.06	1.29
			SP	0.0	0.0
			RU	0.0	0.0
			PV	0.0	0.0
			C	0.76	1.37
			MT	1.66	1.16
			HEM	0.0	0.0
			CH	0.0	0.0
			HL	0.0	0.0
			FR	0.0	0.0
			TH	0.0	0.0
			PR	0.0	0.0
			NC	0.0	0.0
			CC	0.0	0.0
			Z	0.0	0.0

98.06

98.06

PETROLOGIC VALUES: (IN MOLF PCT UNLESS INDICATED AS WT PCT BY W)

RATIOS	TRIANGULAR QTS	BASALT TETRAHEDRON
KUNO SI W	13.599	PLAG 24.06
KUNO SI M	7.660	NE 0.0
POLDERVAART	29.826	DL 0.0
COOMBS	0.516	HY 7.62
LARSEN	21.178	Q 68.12
THORNTON II	5.597	0.0
THORNTON DI	80.574	CPX 0.0
CI	10.494	NE 0.0
AL2O3/SIO2	0.145	DL 0.0
FEMG	60.770	HY 10.30
FE2/FE3	81.710	Q 89.70
NA + K	7.207	0.0
NA + R/A	0.567	0.0
AL2/SI6	0.032	A/MG 4.80

GRANITE TETRAHEDRON-W-

OR	20.09	28.62
AB	37.32	53.15
AN	12.80	18.23
Q	19.94	0.0
PLAG	0.0	0.0

25.98	0.0	38.03	22.29
40.25	53.27	0.0	0.0
0.0	18.27	24.23	0.0
25.77	28.46	37.73	22.11
0.0	0.0	0.0	55.60

A26

SAMPLE NUMBER 5

OXIDE	WT PCT	MOLE PCT	NORMATIVE	MINERALS	WT PCT	MOLE PCT
SiO2	63.49	71.13	MS		0.0	0.0
TiO2	0.71	0.60	KP		0.0	0.0
Al2O3	15.35	10.14	LC		0.0	0.0
Fe2O3	1.65	0.71	MS		0.0	0.0
FeO	3.38	3.17	DR		15.84	4.89
MnO	0.09	0.09	AA		29.53	9.67
MgO	1.97	3.29	AN		18.30	11.30
CaO	4.24	5.09	NE		0.0	0.0
Na2O	3.49	3.79	Q		20.02	57.23
K2O	2.68	1.92	OL		0.0	0.0
P2O5	0.18	0.09	FO		0.0	0.0
BaO	0.0	0.0	FA		0.0	0.0
SrO	0.0	0.0	LN		0.0	0.0
CR2O3	0.0	0.0	HY		6.08	12.38
F	0.0	0.0	EN		7.79	7.79
CL	0.0	0.0	FS		3.53	4.60
SO3	0.0	0.0	DI		1.29	0.97
S	0.0	0.0	MO		0.65	0.48
CO2	0.0	0.0	EM		0.36	0.30
ZRO2	0.0	0.0	FS		0.28	0.18
			MO		0.0	0.0
			AC		0.0	0.0
			AP		0.42	0.22
			IL		1.35	1.53
			SP		0.0	0.0
			RU		0.0	0.0
			PV		0.0	0.0
			C		0.0	0.0
			MT		2.45	1.82
			HEM		0.0	0.0
			CH		0.0	0.0
			HL		0.0	0.0
			FR		0.0	0.0
			TH		0.0	0.0
			PS		0.0	0.0
			MC		0.0	0.0
			CC		0.0	0.0
			Z		0.0	0.0

97.27

PETROLOGIC VALUES: (IN MOLE PCT UNLESS INDICATED AS WT PCT BY W)

	WT PCT	MOLE PCT	MINERALS	WT PCT	MOLE PCT
RATTOS	25.549	A	38.88	PLAG	23.16
KUNO SI W	14.913	C	34.68	NE	0.0
KUNO SI	15.357	F	26.43	OL	0.0
POLDERVAART	0.527	A	46.92	HY	13.67
CROMBS	16.289	F	26.04	Q	63.18
LARSEN	7.053	M	27.05		0.0
THORNTON II	71.787	ALK	26.32	Cpx	1.37
THORNTON DI	15.741	AL	20.43	NE	0.0
CI	0.142	CFM	53.25	OL	0.0
AL2O3/SIO2	54.116	II	0.0	HY	17.54
FENG	81.636	DI	7.46	Q	81.09
FE2/FE3	5.706	DI	16.64		0.0
NA + K	0.563	CI	75.90		0.0
NA + K/A	0.027		0.0	A/MG	1.73
AL2/SI6					

GRANITE TETRAHEDRON-W-

	WT PCT	MOLE PCT
DR	15.84	24.87
AB	29.53	46.38
AN	18.30	28.75
Q	20.02	0.0
PLAG	0.0	0.0

97.27

	WT PCT	MOLE PCT
DR	15.84	24.87
AB	29.53	46.38
AN	18.30	28.75
Q	20.02	0.0
PLAG	0.0	0.0



A27

SAMPLE NUMBER 7

OXIDE	WT PCT	MOLF PCT	MORBATIC MINERALS	WT PCT	MOLF PCT
SiO2	67.58	75.16	KS	0.0	0.0
TiO2	0.54	0.45	KD	0.0	0.0
Al2O3	15.13	9.85	LC	0.0	0.0
Fe2O3	1.23	0.51	NS	0.0	0.0
FeO	2.46	2.20	TR	19.50	5.88
MnO	0.07	0.07	AR	34.86	11.16
MgO	1.02	1.69	AN	11.70	7.05
CaO	2.54	3.03	NF	0.0	0.0
Na2O	4.12	4.44	O	23.16	64.69
K2O	3.30	2.34	OL	0.0	0.0
P2O5	0.14	0.07	FD	0.0	0.0
R2O	0.0	0.0	FA	0.0	0.0
SrO	0.0	0.0	LN	0.0	0.0
CR2O3	0.0	0.0	HY	5.28	7.73
F	0.0	0.0	FN	2.54	4.25
Cl	0.0	0.0	FS	2.74	3.48
SO3	0.0	0.0	DT	0.0	0.0
S	0.0	0.0	MO	0.0	0.0
CO2	0.0	0.0	FN	0.0	0.0
ZrO2	0.0	0.0	FS	0.0	0.0
			MO	0.0	0.0
			AC	0.0	0.0
			AP	0.33	0.17
			IL	1.03	1.13
			Sp	0.0	0.0
			RU	0.0	0.0
			PV	0.0	0.0
			C	0.54	0.90
			MT	1.78	1.29
			HEM	0.0	0.0
			CH	0.0	0.0
			HL	0.0	0.0
			FR	0.0	0.0
			TH	0.0	0.0
			PR	0.0	0.0
			NC	0.0	0.0
			CC	0.0	0.0
			Z	0.0	0.0

96.18 98.18

PETROLOGIC VALUES: (IN MOLF PCT UNLESS INDICATED AS WT PCT BY W)

RATIOS	WT PCT	MOLF PCT	TETRAHEDRAL PLOTS	WT PCT	MOLF PCT
KUNO SI W	14.992	53.78	A	20.09	20.09
KUNO SI	9.409	26.00	C	0.0	0.0
POLDERVAART	25.904	27.22	F	0.0	0.0
COOMBS	0.515	63.03	A	6.53	6.53
LARSEN	21.507	21.26	F	71.38	71.38
THORNTON II	4.839	15.71	M	0.0	0.0
THORNTON DI	9.177	40.01	AIK	0.0	0.0
CI	0.112	18.67	AL	0.0	0.0
AL2O3/SIO2	0.112	41.32	CFM	0.0	0.0
FMG	62.378	0.0	NE	0.0	0.0
FE2/FE3	0.136	0.0	OL	0.0	0.0
NA + K	4.734	0.0	HY	10.67	10.67
NA + K/A	0.032	0.0	Q	0.0	0.0
AL2/Si6	0.033	0.0	PLAG	0.0	0.0
			PLAG	4.01	4.01

GRANITE TETRAHEDRON-W-

DR	WT PCT	MOLF PCT
DR	19.50	20.52
AR	34.86	57.77
AN	11.70	17.70
U	23.16	0.0
PLAG	0.0	0.0

WT PCT	MOLF PCT
0.0	0.0
35.87	0.0
0.0	0.0
21.51	0.0
42.61	25.94
0.0	57.18

A28

30781 - NUMBER 3

OXIDE	WT PCT	MOLE PCT	COGNITIVE MINERALS	WT PCT	MOLE PCT
SiO2	52.24	70.74	KF	0.0	0.0
TiO2	0.74	0.64	KP	0.0	0.0
Al2O3	15.67	10.32	LC	0.0	0.0
Fe2O3	1.42	2.63	NS	0.0	0.0
FeO	3.24	3.03	OR	19.38	6.00
MnO	0.68	0.63	AR	30.12	10.43
MgO	2.64	3.40	AN	17.59	11.49
CaO	4.20	5.03	NE	0.0	0.0
Na2O	3.56	3.86	O	17.95	54.25
K2O	3.11	2.72	OL	0.0	0.0
P2O5	0.19	0.07	FO	0.0	0.0
BaO	0.0	0.0	FA	0.0	0.0
SrO	0.0	0.0	LN	0.0	0.0
CR2O3	0.0	0.0	HV	7.78	12.70
F	0.0	0.0	EN	4.60	8.33
CL	0.0	0.0	FS	3.18	4.37
SO3	0.0	0.0	DI	1.65	1.71
S	0.0	0.0	MO	0.84	0.66
CO2	0.0	0.0	FN	0.48	0.43
ZrO2	0.0	0.0	FS	0.33	0.23
			MO	0.0	0.0
			AC	0.0	0.0
			AP	0.44	0.24
			IL	1.44	1.73
			Sp	0.0	0.0
			PV	0.0	0.0
			C	0.0	0.0
			MT	2.35	1.84
			HEM	0.0	0.0
			CH	0.0	0.0
			HL	0.0	0.0
			FR	0.0	0.0
			TH	0.0	0.0
			PR	0.0	0.0
			NC	0.0	0.0
			CC	0.0	0.0
			Z	0.0	0.0

97.70

PETROLOGIC VALUES: (IN MOLE PCT UNLESS INDICATED AS WT PCT BY W)

RATIOS	WT PCT	MOLE PCT	MINERALS	WT PCT	MOLE PCT
KUND SI W	25.777	41.01	PLAG	24.66	97.70
KUND SI	15.033	33.95	NE	0.0	0.0
POLDERVAART	16.373	25.04	OL	0.0	0.0
COOMBS	0.529	48.59	HY	14.29	0.0
LARSEN	16.236	24.23	Q	61.05	0.0
THORNTON II	7.014	27.18	Cpx	0.0	0.0
THORNTON DI	70.684	27.69	NE	0.0	0.0
CT	14.411	19.50	OL	0.0	0.0
AL2O3/SiO2	0.166	52.61	HY	18.60	0.0
FEMC	52.193	0.0	Q	79.47	0.0
FE2/FF3	81.636	7.45			
NA + K	6.074	17.44			
NA + K/A	0.589	75.11	A/MG	1.79	0.0
AL2/Si6	0.029	0.0			

GRANITE TETRAHEDRON-W-

MINERAL	WT PCT	MOLE PCT
DR	18.38	27.81
AB	30.12	45.58
AN	17.59	26.62
Q	17.95	0.0
PLAG	0.0	0.0

MINERAL	WT PCT	MOLE PCT
DR	34.09	21.87
AB	0.0	0.0
AN	32.63	0.0
Q	33.28	21.35
PLAG	0.0	56.78

A29

SAMPLE NUMBER 9

OXIDE	WT PCT	MOLF PCT	NORMATIVE MINERALS	WT PCT	MOLF PCT
SiO2	67.69	75.52	KS	0.0	0.0
TiO2	0.50	0.42	KP	0.0	0.0
Al2O3	15.44	10.28	LC	0.0	0.0
Fe2O3	0.44	0.37	NS	0.0	0.0
FeO	1.76	1.64	OR	23.40	7.31
MnO	0.06	0.06	AB	33.26	11.02
MgO	0.87	1.45	AN	11.80	7.37
CaO	2.60	3.11	NE	0.0	0.0
Na2O	3.93	4.25	Q	22.46	64.98
K2O	3.96	2.82	OL	0.0	0.0
P2O5	0.17	0.08	FD	0.0	0.0
RaO	0.0	0.0	FA	0.0	0.0
SrO	0.0	0.0	LN	0.0	0.0
Cr2O3	0.0	0.0	HY	3.96	6.11
F	0.0	0.0	EN	2.17	3.75
Cl	0.0	0.0	FS	1.79	2.36
S03	0.0	0.0	DT	0.0	0.0
S	0.0	0.0	HO	0.0	0.0
CO2	0.0	0.0	EN	0.0	0.0
ZRO2	0.0	0.0	FS	0.0	0.0
			MO	0.0	0.0
			AC	0.0	0.0
			AP	0.40	0.21
			TL	0.95	1.09
			SP	0.0	0.0
			RU	0.0	0.0
			PV	0.0	0.0
			C	0.56	0.96
			MT	1.28	0.96
			HEM	0.0	0.0
			CH	0.0	0.0
			HL	0.0	0.0
			FR	0.0	0.0
			TH	0.0	0.0
			PR	0.0	0.0
			MC	0.0	0.0
			CC	0.0	0.0
			Z	0.0	0.0

98.06

98.06

PETROLOGIC VALUES: (IN MOLF PCT UNLESS INDICATED AS WT PCT BY WJ)  
 RATIO'S      W      A      58.00      BASALT TETRAHEDRON      20.35  
 KUNO SI      C      25.50      NE      0.0  
 POLDERVAART      F      16.50      OL      0.0  
 COORBS      A      69.59      HY      6.83  
 LARSEN      22.029      14.17      0      72.62  
 THORNTON II      4.488      14.24      0.0  
 THORNTON DI      83.303      ALK      42.89      CPX      0.0  
 CI      9.246      AL      19.51      NE      0.0  
 AL2O3/SiO2      0.136      CFM      37.60      OL      0.0  
 FFMG      58.170      0.0      HY      8.59  
 FE2/FE3      81.636      II      4.62      0      91.41  
 NA + K      7.069      DI      9.53      0.0  
 NA + K/A      9.687      CI      85.85      0.0  
 AL2/SiO      0.031      0.0      A/MG      4.89

GRANITE TETRAHEDRON-W-  
 OR      23.40      34.19      29.58  
 AB      33.26      48.58      49.25  
 AN      11.80      17.24      0.0  
 Q      22.46      0.0      0.0  
 PLAG      0.0      0.0      33.27      38.96      24.71      49.55

A30

SAMPLE NUMBER 10

OXIDE	WT PCT	MOLE PCT	NORMATIVE MINERALS	WT PCT	MOLE PCT
SiO2	70.74	77.34	KS	0.0	0.0
TiO2	0.39	0.37	KP	0.0	0.0
Al2O3	14.56	9.65	LC	0.0	0.0
Fe2O3	0.49	0.36	NS	0.0	0.0
FeO	1.76	1.62	OR	21.93	6.32
MnO	0.06	0.06	AB	33.76	10.33
MgO	0.71	1.16	N	10.77	6.21
CaO	2.34	2.876	NE	0.0	0.0
Na2O	3.59	4.426	O	26.24	70.06
K2O	3.71	2.51	OL	0.0	0.0
P2O5	0.13	0.06	EN	0.0	0.0
CaO	0.0	0.0	FA	0.0	0.0
SR0	0.0	0.0	LN	0.0	0.0
CR2O3	0.0	0.0	HY	3.74	5.22
F	0.0	0.0	EN	1.77	2.82
Cl	0.0	0.0	FS	1.97	2.40
SO3	0.0	0.0	OI	0.0	0.0
S	0.0	0.0	MO	0.0	0.0
CO2	0.0	0.0	EN	0.0	0.0
ZRO2	0.0	0.0	FS	0.0	0.0
			MD	0.0	0.0
			AC	0.0	0.0
			AP	0.30	0.15
			IL	0.74	0.78
			SP	0.0	0.0
			RU	0.0	0.0
			PV	0.0	0.0
			C	0.03	0.05
			MT	1.28	0.88
			HEM	0.0	0.0
			CH	0.0	0.0
			HL	0.0	0.0
			FR	0.0	0.0
			TH	0.0	0.0
			PR	0.0	0.0
			NC	0.0	0.0
			CC	0.0	0.0
			Z	0.0	0.0

98.79

98.79

PETROLOGIC VALUES: (IN MOLE PCT UNLESS INDICATED AS WT PCT BY W)

RATIOS	WT PCT	MOLE PCT	UNLESS INDICATED AS WT PCT BY W)	MINERALS	WT PCT	MOLE PCT
KUND SI W	11.633	A	59.12	PLAG	18.01	
KUND SI	6.425	C	23.78	NE	0.0	
PCLDERVAART	27.359	F	17.10	OL	0.0	
COOMRS	0.510	A	71.13	HY	5.69	
LARSEN	23.158	F	16.79	Q	76.30	
THURNTON II	3.483	M	12.07			
THURNTON DI	86.700	ALK	45.78	CPX	0.0	
CI	7.621	AL	17.23	NE	0.0	
AL2O3/SIO2	0.122	CFM	36.99	OL	0.0	
FEMG	63.018		0.0	HY	6.94	
FE2/FE3	81.636	II	3.56	Q	93.06	
NA + K	6.963	OI	7.79			
NA + K/A	0.727	CI	88.65			
AL2/SI6	0.530		0.0	A/HG	5.89	

GRANITE TETRAHEDRON-M-

OR	21.93	32.99
AB	33.76	50.80
AN	10.77	16.20
Q	26.24	0.0
PLAG	0.0	0.0

GRANITE TETRAHEDRON-W-

OR	21.93	32.99
AB	33.76	50.80
AN	10.77	16.20
Q	26.24	0.0
PLAG	0.0	0.0

GRANITE TETRAHEDRON-X-

OR	21.93	32.99
AB	33.76	50.80
AN	10.77	16.20
Q	26.24	0.0
PLAG	0.0	0.0

A31

SAMPLE NUMBER 11

OXIDE	WT PCT	MOLE PCT	INDICATIVE MINERALS	WT PCT	MOLE PCT
SiO2	51.92	55.51	KS	0.0	0.0
TiO2	1.85	1.69	KP	0.0	0.0
Al2O3	15.86	10.91	LC	0.0	0.0
Fe2O3	2.15	0.87	NS	0.0	0.0
FeO	8.40	7.70	UR	11.35	4.66
MnO	0.15	0.14	AR	26.74	11.65
MgO	7.24	11.56	AN	23.42	19.23
CaO	6.96	7.87	ME	0.0	0.0
Na2O	3.16	3.28	O	0.0	0.0
K2O	1.92	1.31	OL	3.76	5.34
P2O5	0.59	0.27	FO	2.23	3.62
SiO	0.0	0.0	FA	1.53	1.72
SrO	0.0	0.0	LN	0.0	0.0
Cr2O3	0.0	0.0	HY	21.40	44.23
F	0.0	0.0	EN	13.18	30.00
Cl	0.0	0.0	FS	8.22	14.23
SO3	0.0	0.0	DI	5.54	5.58
S	0.0	0.0	MO	2.84	2.79
CO2	0.0	0.0	EN	1.66	1.89
ZrO2	0.0	0.0	FS	1.04	0.98
			WD	0.0	0.0
			AC	0.0	0.0
			AP	1.37	0.95
			IL	3.51	5.29
			SP	0.0	0.0
			RU	0.0	0.0
			PV	0.0	0.0
			C	0.0	0.0
			HT	3.12	3.08
			HEM	0.0	0.0
			CH	0.0	0.0
			HL	0.0	0.0
			FR	0.0	0.0
			TH	0.0	0.0
			PR	0.0	0.0
			NC	0.0	0.0
			CC	0.0	0.0
			Z	0.0	0.0

100.20

100.21

PETROLOGIC VALUES: (IN MOLE PCT UNLESS INDICATED AS WT PCT BY WJ)

RATIOS	WT PCT	MOLE PCT	INDICATIVE MINERALS	WT PCT	MOLE PCT
KUMD SI W	46.751	21.83	A	38.39	38.39
KUMD SI	31.383	37.43	C	0.0	0.0
POLDERVAART	-11.336	40.74	F	6.64	6.64
COOMRS	0.820	19.26	A	54.98	54.98
LARSEN	-0.273	32.30	F	0.0	0.0
THORNTON II	22.268	48.45	M	10.12	10.12
THORNTON DI	16.304	12.37	ALK	0.0	0.0
CI	41.140	14.59	AL	0.0	0.0
AL2O3/SiO2	0.180	73.05	CFM	9.68	9.68
FEMG	42.580	0.0	HY	80.20	80.20
FE2/FE1	85.890	0.0	NE	0.0	0.0
NA + K	4.593	0.0	HY	0.0	0.0
NA + K/A	0.459	0.0	O	0.0	0.0
AL2/Si6	0.028	0.0	A/MG	0.40	0.40

GRANITE TETRAMEDRON-W-  
 OR 11.35 18.45 29.79  
 AB 26.74 43.47 70.21  
 AN 23.42 38.08 0.0  
 Q 0.0 0.0 0.0  
 PLAG 0.0 0.0 0.0

32.63 18.45  
 0.0 0.0  
 53.31 0.0  
 46.69 0.0  
 0.0 0.0  
 0.0 0.0

A32

SAMPLE NUMBER 12

OXIDE	WT PCT	MOLE PCT	MINORATIVE MINERALS	WT PCT	MOLE PCT
SiO2	55.55	44.60	KC	0.0	0.0
TiO2	0.18	0.15	KP	0.0	0.0
Al2O3	11.43	7.54	LC	0.0	0.0
Fe2O3	0.20	0.08	NS	0.0	0.0
FFO	0.48	0.44	OR	31.44	7.24
MNO	0.08	0.07	AB	22.09	5.40
MGO	0.10	0.16	AN	2.52	1.16
CAO	0.52	0.61	NE	0.0	0.0
NA2O	2.61	2.79	Q	39.51	84.30
K2O	0.32	3.75	OL	0.0	0.0
FeO	0.01	0.00	FO	0.0	0.0
Fe2O3	0.0	0.0	FA	0.0	0.0
FeO	0.0	0.0	LN	0.0	0.0
FeO	0.0	0.0	HY	0.82	0.87
FeO	0.0	0.0	EM	0.25	0.32
FeO	0.0	0.0	FS	0.57	0.55
FeO	0.0	0.0	DI	0.0	0.0
FeO	0.0	0.0	HO	0.0	0.0
FeO	0.0	0.0	FN	0.0	0.0
FeO	0.0	0.0	FS	0.0	0.0
FeO	0.0	0.0	WO	0.0	0.0
FeO	0.0	0.0	AC	0.0	0.0
FeO	0.0	0.0	AP	0.02	0.01
FeO	0.0	0.0	IL	0.34	0.29
FeO	0.0	0.0	SP	0.0	0.0
FeO	0.0	0.0	RU	0.0	0.0
FeO	0.0	0.0	PV	0.0	0.0
FeO	0.0	0.0	C	0.46	0.57
FeO	0.0	0.0	MT	0.29	0.16
FeO	0.0	0.0	HEM	0.0	0.0
FeO	0.0	0.0	CH	0.0	0.0
FeO	0.0	0.0	ML	0.0	0.0
FeO	0.0	0.0	FR	0.0	0.0
FeO	0.0	0.0	TH	0.0	0.0
FeO	0.0	0.0	PS	0.0	0.0
FeO	0.0	0.0	MC	0.0	0.0
FeO	0.0	0.0	CC	0.0	0.0
FeO	0.0	0.0	F	0.0	0.0

97.48

PETROLOGIC VALUES: (IN MOLE PCT UNLESS INDICATED AS WT PCT BY W)

RATIO	WT PCT	MOLE PCT	TRIANGULAR PLOTS	BASALT TETRAHEDROM	PLAG	7.15
KUMD SI W	2.275	85.14	A	PLAG	0.0	0.0
KUMD SI	1.148	8.01	C	NE	0.0	0.0
POLDERVAART	20.751	6.85	F	GL	0.0	0.0
COOMBS	0.501	91.50	A	HY	0.95	0.95
LARSEN	29.257	6.20	F	Q	91.90	0.0
THORNTON II	1.295	2.30	M		0.0	0.0
THORNTON DI	96.939	75.52	ALK	CPX	0.0	0.0
CI	1.319	10.36	AL	NE	0.0	0.0
AL2O3/SIO2	0.088	14.12	CFM	OL	0.0	0.0
FEHG	76.182	0.0		HY	1.02	1.02
FE2/FE3	84.213	1.30	TI	Q	98.98	0.0
NA + K	6.539	1.32	DI		0.0	0.0
NA + K/A	0.879	97.37	CI	A/MG	0.0	0.0
AL2/SI6	0.026	0.0			99.75	99.75

GRANITE TETRAHEDROM-W-

OP	WT PCT	MOLE PCT
OP	51.44	56.10
AB	22.09	39.41
AN	2.52	4.49
Q	39.51	0.0
PLAG	0.0	0.0

42.79 32.90  
0.0 0.0  
36.45 0.0  
3.92 0.0  
61.63 41.35  
0.0 25.75

A33

SAMPLE NUMBER 14

OXIDE	WT PCT	MOLE PCT	NORMATIVE MINERALS	WT PCT	MOLE PCT
SiO2	51.76	61.76	KS	0.0	0.0
TiO2	1.42	1.27	KP	0.0	0.0
Al2O3	21.18	14.90	LC	0.0	0.0
Fe2O3	2.56	1.15	NS	0.0	0.0
FeO	5.00	4.98	OR	21.10	5.19
MnO	0.10	0.10	AR	9.98	2.64
MgO	3.66	6.15	AN	4.59	2.26
CaO	1.16	1.43	ME	0.0	0.0
Na2O	1.18	1.37	Q	18.51	42.23
K2O	3.57	2.72	OL	0.0	0.0
P2O5	0.18	0.09	FO	0.0	0.0
BaO	0.0	0.0	FA	0.0	0.0
SrO	0.0	0.0	LN	0.0	0.0
Cr2O3	0.0	0.0	HY	20.87	24.49
F	0.0	0.0	EN	8.62	11.76
Cl	0.0	0.0	FS	12.25	12.73
SrO	0.0	0.0	DI	0.0	0.0
S	0.0	0.0	MO	0.0	0.0
CO2	0.0	0.0	EM	0.0	0.0
ZrO2	0.0	0.0	FS	0.0	0.0
			MO	0.0	0.0
			AC	0.0	0.0
			AP	0.42	0.17
			IL	2.70	2.44
			SP	0.0	0.0
			RU	0.0	0.0
			PV	0.0	0.0
			C	13.69	18.41
			MT	3.71	2.20
			MEM	0.0	0.0
			CH	0.0	0.0
			HL	0.0	0.0
			FR	0.0	0.0
			TH	0.0	0.0
			PR	0.0	0.0
			NC	0.0	0.0
			CC	0.0	0.0
			7	0.0	0.0

95.57

PETROLOGIC VALUES: IN MOLE PCT UNLESS INDICATED AS WT PCT BY WJ

RATIOS	W	M	W	M	W	M
KUMD SI	30.212	A	26.01	PLAG	6.80	
KUMD SI	17.501	C	9.45	NE	0.0	
POLDERVAART	-25.157	F	64.54	OL	0.0	
CROMS	0.561	A	21.24	HY	34.21	
LARSEN	14.314	F	45.74	Q	58.99	
THORNTON II	33.039	M	32.02		0.0	
THORNTON DI	50.032	ALK	12.86	CPIX	0.0	
CI	8.143	AL	34.31	NE	0.0	
AL2O3/SIO2	0.241	CFM	52.73	OL	0.0	
FEMG	62.214	II	0.0	HY	36.71	
FE2/FE3	88.655	II	36.55	O	63.29	
NA + K	0.044	DI	9.88		0.0	
NA + K/A	0.274	CI	54.57		0.0	
AL2/Si6	0.022		0.0	A/MG	0.66	

GRANITE TETRAHEDRON-W-

DR	21.10	59.14	42.34	0.0	47.73	38.94
AB	9.98	27.99	20.13	0.0	0.0	0.0
AN	4.59	12.47	0.0	13.27	10.39	0.0
Q	18.51	0.0	37.33	55.95	41.94	34.16
PLAG	0.0	0.0	0.0	0.0	0.0	26.90

A34

SAMPLE NUMBR 15

OXIDE	WT PCT	MOLF PCT	NORMATIVE MINERALS	WT PCT	MOLF PCT
SiO2	56.07	53.15	KS	0.0	0.0
TiO2	0.42	0.30	KP	0.0	0.0
Al2O3	6.27	3.50	LC	0.0	0.0
Fe2O3	1.00	0.34	NS	0.0	0.0
FeO	4.97	3.85	OR	1.36	0.43
MnO	0.43	0.35	AR	7.45	0.83
MgO	12.20	17.23	AN	15.13	9.66
CaO	20.32	20.64	NE	0.0	0.0
Mg2O	0.29	0.27	Q	7.28	21.52
K2O	0.23	0.14	OL	0.0	0.0
P2O5	0.53	0.21	FC	0.0	0.0
NaO	0.0	0.0	FA	0.0	0.0
SiO	0.0	0.0	LM	0.0	0.0
Cr2O3	0.0	0.0	HY	7.33	12.88
F	0.0	0.0	EN	5.77	10.21
Cl	0.0	0.0	FS	1.56	2.10
SO3	0.0	0.0	DI	65.62	52.54
S	0.0	0.0	MD	34.34	26.27
CO2	0.0	0.0	EM	25.82	21.78
ZnO2	0.0	0.0	FS	6.66	4.69
			WO	0.0	0.0
			AC	0.0	0.0
			AP	1.23	0.66
			IL	0.80	0.93
			SP	0.0	0.0
			RU	0.0	0.0
			PV	0.0	0.0
			C	0.0	0.0
			MT	1.45	1.11
			HEM	0.0	0.0
			CH	0.0	0.0
			ML	0.0	0.0
			FR	0.0	0.0
			TH	0.0	0.0
			PR	0.0	0.0
			NC	0.0	0.0
			CC	0.0	0.0
			Z	0.0	0.0

102.63

PETROLOGIC VALUES: (IN MOLE PCT UNLESS INDICATED AS WT PCT BY W)

MINERAL	WT PCT	MOLF PCT	TRIANGLAR PLOTS	RASALT TETRAHEDRON
KUNO SI W	78.95	A	1.61	PLAG 23.68
KUNO SI	65.627	C	81.70	NE 0.0
PLODERVAART	-11.167	F	16.69	OL 0.0
CHORAS	0.238	A	1.89	HY 21.77
LARSEN	-20.087	F	17.95	Q 48.55
THORNTON II	21.499	M	80.16	CPX 60.83
THORNTON DI	22.782	ALK	0.90	NE 0.0
CI	49.682	AL	6.85	OL 0.0
AL2O3/SIO2	0.066	CFM	92.24	HY 17.75
FEMG	13.659			
FE2/FE3	91.543	II	22.84	
NA + K	0.406	JI	52.87	
NA + K/A	0.116	CI	24.25	
AL2/Si6	7.003			8/MG 0.02

GRANITE TETRAHEDRON-W-

MINERAL	WT PCT	MOLF PCT
OR	1.36	7.19
AR	2.45	12.94
AN	15.13	79.87
Q	7.28	0.0
PLAG	0.0	0.0

12.26  
22.13  
0.0  
65.61  
0.0

0.0  
9.87  
60.86  
29.27  
0.0

5.72  
0.0  
63.66  
30.62  
0.0

5.18  
0.0  
0.0  
27.75  
57.06