Division of Geological & Geophysical Surveys

PUBLIC-DATA FILE 93-6

LAND SELECTION UNIT 6 (TYONEK QUADRANGLE): REFERENCES, DGGS SAMPLE LOCATIONS, GEOCHEMICAL AND MAJOR OXIDE DATA

by

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March 1993

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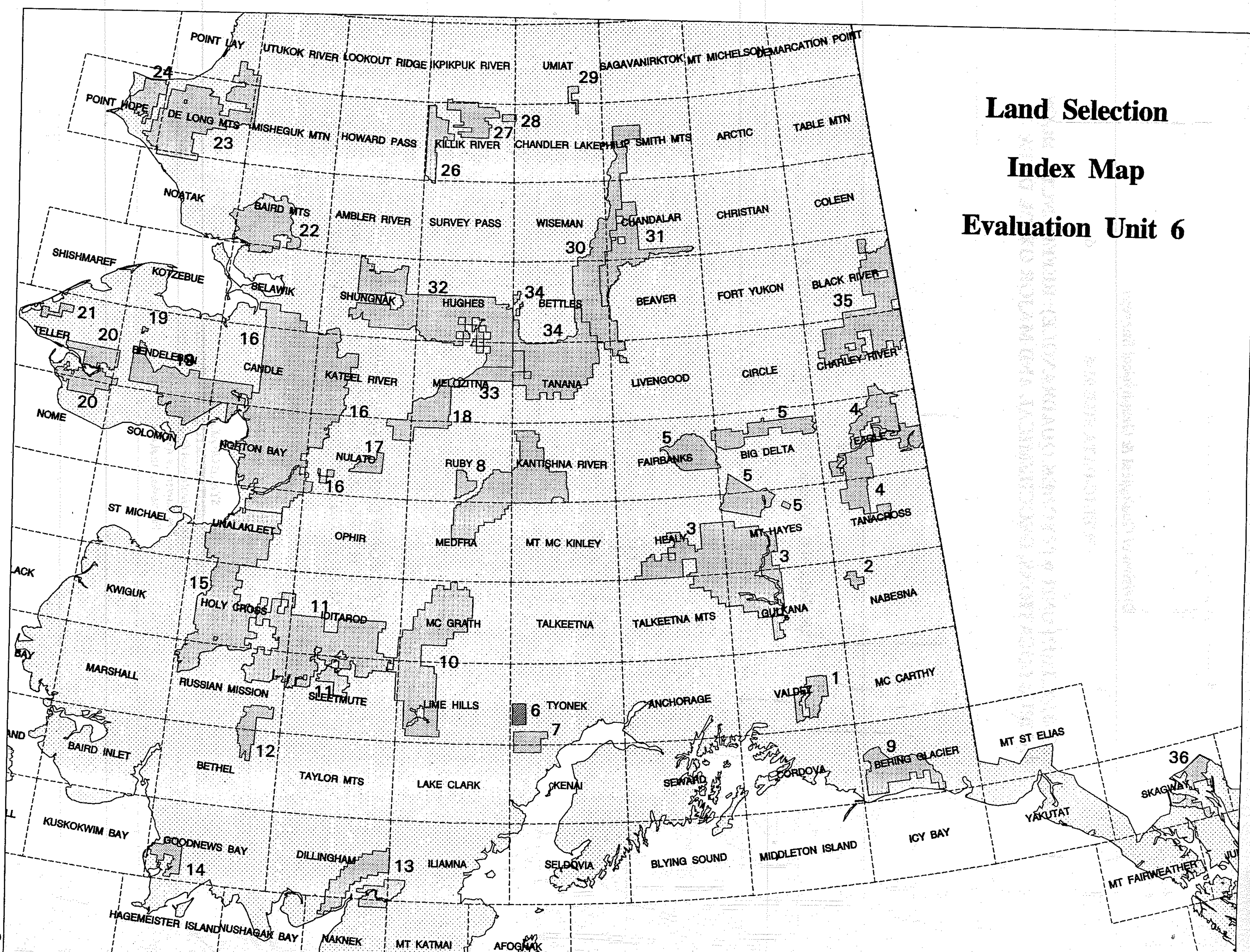
STATE OF ALASKA
DEPARTMENT OF NATURAL RESOURCES
Division of Geological & Geophysical Surveys
794 University Avenue, Suite 200
Fairbanks, Alaska 99709-3645

Land Selection Index Map

Evaluation Unit 6



LAND SELECTION UNIT 6 (TYONEK QUADRANGLE): REFERENCES, DGGS SAMPLE LOCATIONS, GEOCHEMICAL AND MAJOR OXIDE DATA

The West Tordrillo Foothills evaluation unit (Unit 6) encompasses 138,000 acres in the Tyonek quadrangle. The area is underlain by Cretaceous and Tertiary plutonic rocks, with Mesozoic metasedimentary roof pendants, screens, and inclusions. The plutonic rocks are generally felsic to intermediate in composition, and include rocks of the Styx River batholith, the Nagishlamina River granodiorite, minor Mesozoic diorite and gabbro, and areas of undifferentiated plutonic rock.

There is no known history of mining activity in Unit 6. DGGS collected rock samples anomalous in Cu, Mo, Au, Bi and Mn from the eastern portion of the unit in rocks that appear similar to Nagishlamina River granodiorite. NURE lead and zinc geochemical anomalies in the northwest portion of the area, and a nearby Pb-Zn prospect suggest the possibility of polymetallic vein deposits in the Unit. In addition to mineral resource potential, this area holds a low to moderate potential for a building stone resource.

In this Public-Data File, we present results of limited DGGS field work done in June 1992 in Unit 6. The work was done in support of DGGS mineral resource evaluation of lands available for selection as State land. References used in the evaluation of Unit 6 are listed on a following page. Samples collected by DGGS are briefly described in the first table. In the geochemical tables, the asterisks in the left-hand column indicate the analytical procedure that we consider to be more reliable for those elements that were analyzed by more than one method. Major oxide compositions are plotted in Figure 2 according to the method of Streckeisen and LeMaitre (1979). CIPW norms were calculated using the UAF/PETCAL program, with oxide values normalized on an anhydrous basis.

The discriminant scores (Au discrim.) shown at the bottom of the major oxide table are a reflection of how similar the Unit 6 rocks are to other systems which formed gold deposits around the world. The score is based on the discriminant functions developed by Newberry and Burns (1989) and discussed in detail by Burns and others (1991). The discriminant functions statistically determine the extent to which the composition of an unaltered Unit 6 plutonic rock resembles major-oxide compositions of unaltered plutonic rocks associated with gold deposits worldwide. The discriminant score is a number between 0 and 100; a score of 100 indicates that the composition of the sample is indistinguishable from those of gold-associated plutons; a score of 0 indicates the opposite. The score is <u>not</u> directly proportional to the amount of gold present and does <u>not</u> indicate that there is gold at the sample site, but it is a good estimate of whether the sample belongs to a plutonic <u>system</u> that had the capability of depositing some gold. Some important limitations which must be considered in the interpretation of the scores are:

1) Only analyses from relatively unaltered rocks can be used.
2) Rocks from porphyry Cu-Mo deposits (because of alteration) and aplites will both typically have a low discriminant score, even though they may be from systems that are related to gold.

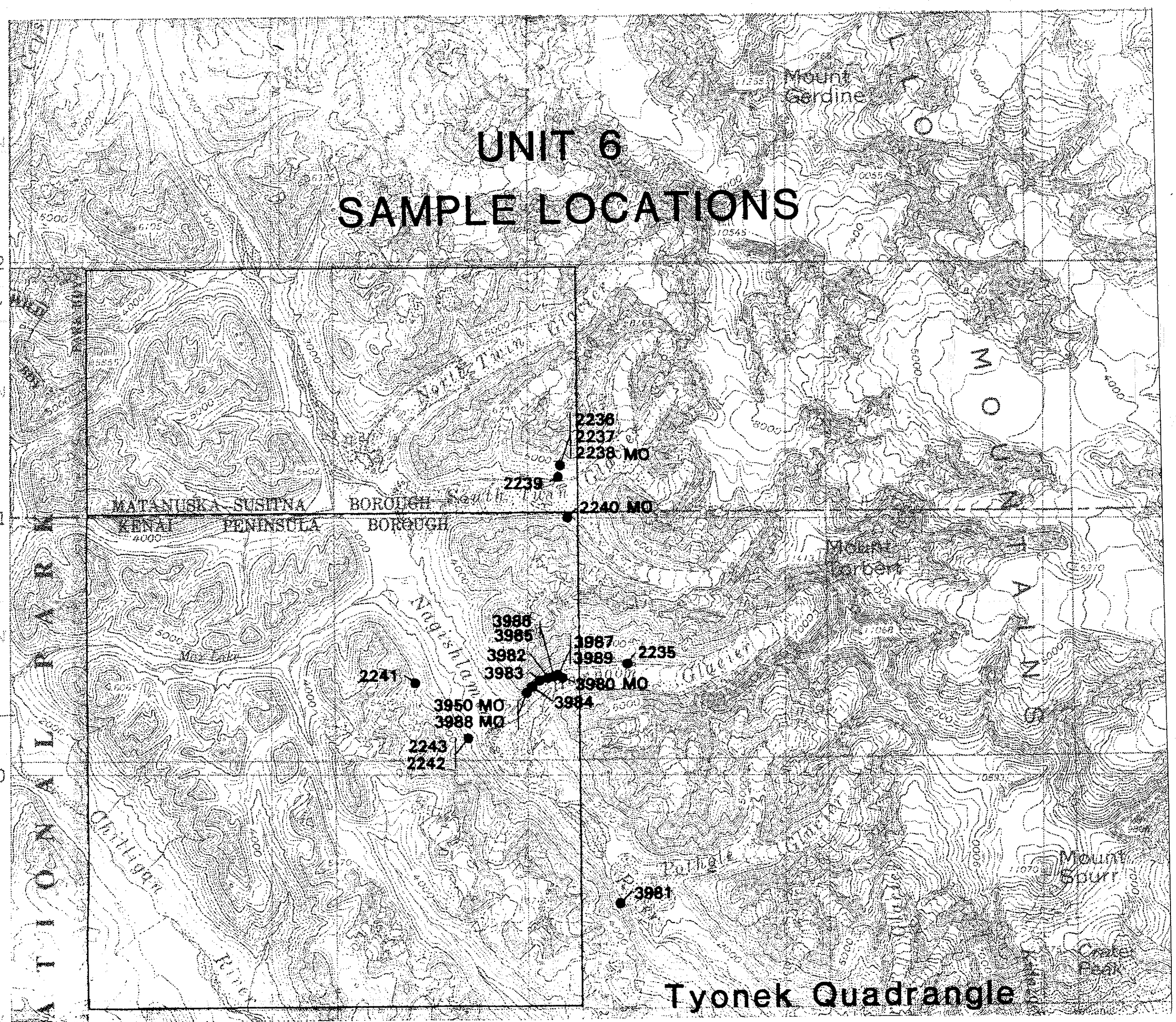
3) Discriminant scores are not given for alkalic (nepheline-normative) rocks, but these rocks may be related to gold.
4) A small percentage of plutonic rocks may appear to be related to gold systems when they are not.

Burns, L.E., Newberry, R.J., and Solie, D.N., 1991, Quartz normative plutonic rocks of Interior Alaska and their favorability for association with gold: Ak. Division of Geological and Geophysical Surveys Report of Investigations 91-3, 71 p., 2 sheets.

Newberry, R.J. and Burns, L.E., 1989, The probabilistic estimation of gold resources in the Circle - Fairbanks - Kantishna area: Ak. Div. of Geological and Geophysical Surveys Public-Data File 89-9, 32 p., 1 sheet.

Streckeisen, A. and LeMaitre, R.W., 1979, A chemical approximation to the modal QAPF classification of the igneous rocks; N. Jb. Miner. Abh., v.136, p.169-206.

PDF 93-6



Tyonek Quadrangle
scale 1:250,000

(Samples located in Tyonek B-7 and B-8 quadrangles)

LAND SELECTION UNIT 6 SAMPLES

QUAD	STATION	GEOCHEM	M. OXIDE	ROCK DESCRIPTION	LATITUDE	LONGITUDE
Ty B-7	92CN01	3987		Granitic	61.370	-152.602
Ty B-7	92CN01		3989	Granitic	61.370	-152.602
Ty B-7	92CN02		3988	Hb monzonite/granodiorite, moderate ep veining	61.364	-152.625
Ty B-7	92DNS50	2235		Granodiorite w/ clots of py & cpy	61.373	-152.551
Ty B-7	92DNS51	2237		Specular hematite & MnO(?), Fe-ox granite	61.444	-152.599
Ty B-7	92DNS51	2236		Fe-ox granite w/qtz-rich vein	61.444	-152.599
Ty B-7	92DNS51		2238	Med-gr. (Hb)-bt granite	61.444	-152.599
Ty B-7	92DNS52	2239		Dissem. & fracture-fill po, moraine boulder	61.440	-152.600
Ty B-7	92DNS53		2240	Med-gr. lt. grey hb qtz monzonite	61.425	-152.594
Ty B-7	92WM201	3980		Cpy, az, malachite in clots	61.369	-152.598
Ty B-7	92WM202		3981	Med-gr. bt granite	61.364	-152.625
Ty B-7	92WM203	3982		Cpy in hb qtz monzonite	61.369	-152.609
Ty B-7	92WM204	3983		Dissem. py in qtz boulder, moraine	61.368	-152.615
Ty B-7	92WM205	3984		Vein quartz + cpy	61.366	-152.621
Ty B-7	92WM206	3986		Ksp, cpy, ep, azur, plag, qtz, chl - granular host	61.369	-152.605
Ty B-7	92WM206	3985		Ksp, cpy, ep, azur, plag, qtz, chl - granular host	61.369	-152.605
Ty B-8	92DNS54	2241		Specular hem, Fe-ox bt granite	61.367	-152.706
Ty B-8	92DNS55	2242		Fine-gr. bt granodiorite w/py	61.348	-152.668
Ty B-8	92DNS55	2243		Qtz-rich pyritic, possibly a vein	61.348	-152.668

LAND SELECTION UNIT 6 (Analyses by Bondar-Clegg)

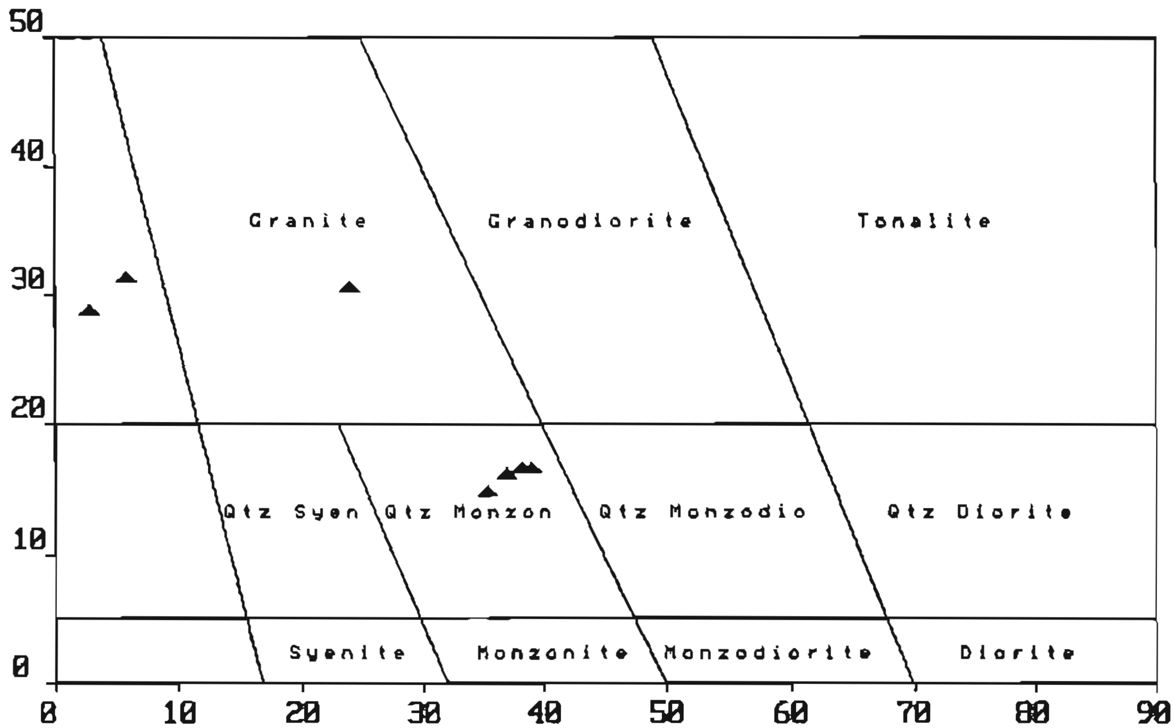
	METHOD	UNIT	L.LIMIT	U.LIMIT	3982	3983	3984	3985	3986	3987	2235	2236
Ag*	ICP	PPM	0.5	50	-0.6	-0.5	-0.5	-0.5	-0.5	-0.5	0.5	-0.5
Ag	INAA	PPM	5	300	-5	-5	-5	-5	-5	-5	-5	-5
Al	ICP	PCT	0.01	10	4.79	1.27	0.36	1.44	1.09	3.79	6.26	4.13
As	ICP	PPM	5	2000	11	-5	9	-5	17	29	47	18
As*	INAA	PPM	1	10000	2	9	2	2	1	1	-1	4
Au	INAA	PPB	5	10000	12	25	15	12	10	-5	-5	-5
Ba	ICP	PPM	5	2000	633	11	20	570	567	38	507	58
Ba*	INAA	PPM	100	20000	1100	520	-100	980	910	550	790	-100
Bi	AA	PPM	1	2000	-1	-1	-1	-1	-1	-1	-1	-1
Bi*	ICP	PPM	5	2000	15	8	-5	8	-5	11	-5	-5
Br	INAA	PPM	1	30000	-1	-1	-1	-1	-1	-1	-1	-1
Ca	ICP	PCT	0.01	10	4.26	0.04	0.23	0.37	0.17	8.79	1.51	0.1
Cd*	ICP	PPM	2	2000	-2	-2	-2	-2	2.5	-2	-2	-2
Cd	INAA	PPM	10	2000	-10	-10	-10	-10	-10	-10	-10	-10
Ce	INAA	PPM	10	30000	38	-10	-10	14	16	10	18	29
Co*	ICP	PPM	1	20000	15	249	3	3	3	7	8	-1
Co	INAA	PPM	10	20000	19	270	-10	-10	-10	13	-10	-10
Cr*	ICP	PPM	2	20000	22	33	29	17	20	66	21	15
Cr**	INAA	PPM	50	30000	-50	-50	-50	-50	-50	140	-50	-50
Cs	INAA	PPM	1	10000	-1	2	-1	-1	1	-1	2	8
Cu	ICP	PPM	1	20000	908	8	801	2267	1981	41	856	10
Eu	INAA	PPM	2	30000	-2	-2	-2	-2	-2	-2	-2	-2
Fe	ICP	PCT	0.01	10	4.29	10	1	0.76	0.64	1.13	1.13	0.92
Fe*	INAA	PCT	0.5	10	5.8	10	1.1	1.2	0.9	2.3	1.3	1.1
Ga	ICP	PPM	10	2000	26	21	-10	21	18	18	25	27
Hf	INAA	PPM	2	30000	4	3	-2	3	3	4	3	9
Ir	INAA	PPB	100	1000	-100	-100	-100	-100	-100	-100	-100	-100
K	ICP	PCT	0.01	10	1.23	1.3	0.06	1.54	1.58	0.44	1.97	1.33
La	ICP	PPM	5	2000	-5	-5	-5	-5	-5	-5	7	39
La*	INAA	PPM	5	30000	16	-5	-5	9	9	-5	9	50
Li	ICP	PPM	2	2000	4	-2	2	2	3	66	2	35
Lu	INAA	PPM	0.5	2000	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	1
Mg	ICP	PCT	0.01	10	0.9	0.07	0.11	0.16	0.14	-0.01	0.13	0.04
Mn	ICP	PPM	5	20000	1005	22	98	127	162	8	182	46
Mo*	ICP	PPM	1	20000	3	31	139	8	8	9	12	2
Mo	INAA	PPM	2	30000	-2	32	160	9	7	2	5	-2
Na*	ICP	PCT	0.01	10	3.54	2.25	0.05	2.44	2.44	1.04	2.72	1.73
Na*	INAA	PCT	0.05	10	3.7	2.2	-0.05	2.8	2.4	0.06	2.7	1.7
Nb	ICP	PPM	5	2000	12	10	-5	7	8	7	7	25
Ni*	ICP	PPM	1	20000	11	15	4	3	5	15	4	2
Ni	INAA	PPM	20	30000	-20	-20	-20	-20	-20	-20	-20	-20
Pb*	AA	PPM	2	10000	3	28	7	3	4	9	3	4
Pb	ICP	PPM	2	10000	5	23	-2	6	4	-2	5	-2
Rb	INAA	PPM	10	10000	54	95	-10	120	130	-10	120	95
Sb	ICP	PPM	5	2000	-5	-5	-5	-5	8	-5	-5	-5
Sb*	INAA	PPM	0.2	9999	0.3	0.8	0.3	1.9	0.5	0.3	0.7	0.6
Sc	INAA	PPM	0.5	2000	15	1.8	1.1	2.7	2.2	13	2.8	-0.5
Se	INAA	PPM	10	30000	-10	220	-10	-10	-10	-10	-10	-10
Sm	INAA	PPM	0.2	2000	5.5	1.2	-0.2	1.4	1.6	1.2	1	10
Sn*	ICP	PPM	20	2000	-20	-20	-20	-20	-20	-20	-20	-20
Sn	INAA	PPM	200	30000	-200	-200	-200	-200	-200	-200	-200	-200
Sn**	XRF	PPM	1	10000	-9	-9	-9	-9	-9	-9		
Sr	ICP	PPM	1	2000	642	35	27	149	105	222	189	21
Ta	ICP	PPM	5	2000	-100	-100	-100	-100	-100	-100	-100	-100
Ta*	INAA	PPM	1	2000	1	-1	-1	-1	1	-1	-1	2
Tb	INAA	PPM	1	30000	-1	-1	-1	-1	-1	-1	-1	2
Te	AA	PPM	0.2	100	-0.2	1	-0.2	-0.2	-0.2	1.7	-0.2	-0.2
Te	ICP	PPM	25	2000	-25	-25	-25	-25	-25	-25	-25	-25
Te	INAA	PPM	20	2000	-20	-20	-20	-20	-20	-20	-20	-20
Th	INAA	PPM	0.5	3000	2.2	3.1	0.7	6	5.2	1.3	4.6	8.7
Ti	ICP	PCT	0.01	10	0.42	0.09	0.03	0.11	0.12	0.24	0.1	0.06
U	INAA	PPM	0.5	2000	1.7	2.6	1	4	3.6	1	2	4
V	ICP	PPM	2	2000	171	13	17	14	14	174	28	2
W	ICP	PPM	20	2000	-20	-20	-20	-20	-20	-20	-20	-20
W*	INAA	PPM	2	30000	-2	4	-2	-2	-2	-2	-2	-2
Y	ICP	PPM	5	2000	6	-5	-5	-5	-5	-5	-5	36
Yb	INAA	PPM	5	2000	-5	-5	-5	-5	-5	-5	-5	-5
Zn*	ICP	PPM	2	20000	85	13	28	31	97	7	11	109
Zn	INAA	PPM	200	30000	230	-200	-200	-200	-200	-200	-200	-200
Zr	ICP	PPM	5	2000	9	-5	-5	-5	-5	59	6	67
Zr*	INAA	PPM	500	10000	-500	-500	-500	-500	-500	-500	-500	-500

	METHOD	UNIT	L.LIMIT	U.LIMIT	2237	2239	2241	2242	2243	3980
Ag*	ICP	PPM	0.5	50	-0.5	-0.5	-0.5	-0.5	-0.5	0.5
Ag	INAA	PPM	5	300	-5	-5	-5	-5	-5	-5
Al	ICP	PCT	0.01	10	4.95	6.51	4.32	6.8	5.74	6.01
As	ICP	PPM	5	2000	10	26	6	18	28	-6
As*	INAA	PPM	1	10000	4	6	-1	5	5	2
Au	INAA	PPB	5	10000	-5	23	-5	15	23	5
Ba	ICP	PPM	5	2000	65	113	23	92	495	442
Ba*	INAA	PPM	100	20000	-100	1700	-100	1000	580	580
Bi	AA	PPM	1	2000	-1	-1	-1	-1	-1	-1
Bi*	ICP	PPM	5	2000	-5	22	-5	-5	-5	-5
Br	INAA	PPM	1	30000	-1	-1	-1	-1	-1	-1
Ca	ICP	PCT	0.01	10	0.07	5.14	0.14	2.78	0.68	0.96
Cd*	ICP	PPM	2	2000	-2	-2	-2	-2	-2	-2
Cd	INAA	PPM	10	2000	-10	-10	-10	-10	-10	-10
Ce	INAA	PPM	10	30000	110	43	54	33	59	-10
Co*	ICP	PPM	1	20000	-1	15	-1	5	-1	38
Co	INAA	PPM	10	20000	-10	19	-10	-10	-10	45
Cr*	ICP	PPM	2	20000	12	16	12	19	20	17
Cr**	INAA	PPM	50	30000	-50	-50	-50	-50	-50	-50
Cs	INAA	PPM	1	10000	3	2	2	-1	-1	1
Cu	ICP	PPM	1	20000	8	164	8	44	53	1619
Eu	INAA	PPM	2	30000	-2	3	-2	-2	-2	-2
Fe	ICP	PCT	0.01	10	0.66	6.44	0.69	2.98	0.66	0.97
Fe*	INAA	PCT	0.5	10	0.8	6.6	0.7	3.4	0.8	0.9
Ga	ICP	PPM	10	2000	26	38	30	29	17	19
Hf	INAA	PPM	2	30000	12	4	6	3	8	3
Ir	INAA	PPB	100	1000	-100	-100	-100	-100	-100	-100
K	ICP	PCT	0.01	10	1.87	1.86	1.95	1.82	1.64	1.64
La	ICP	PPM	5	2000	34	13	14	8	24	-5
La*	INAA	PPM	5	30000	53	21	21	16	29	-5
Li	ICP	PPM	2	2000	9	8	6	8	4	-2
Lu	INAA	PPM	0.5	2000	0.7	0.9	-0.5	-0.5	-0.5	-0.5
Mg	ICP	PCT	0.01	10	0.01	1.15	-0.01	0.62	0.1	0.22
Mn	ICP	PPM	5	20000	201	1677	273	559	62	226
Mo*	ICP	PPM	1	20000	4	7	4	3	4	7
Mo	INAA	PPM	2	30000	-2	-2	-2	-2	-2	6
Na*	ICP	PCT	0.01	10	2.91	3.24	2.99	3.26	2.21	2.35
Na*	INAA	PCT	0.05	10	3	2.9	2.9	3.1	2.2	2
Nb	ICP	PPM	5	2000	25	16	21	10	12	6
Ni*	ICP	PPM	1	20000	2	5	2	4	2	3
Ni	INAA	PPM	20	30000	-20	-20	-20	-20	-20	-20
Pb*	AA	PPM	2	10000	8	7	10	24	6	5
Pb	ICP	PPM	2	10000	10	7	12	20	16	7
Rb	INAA	PPM	10	10000	150	83	190	33	85	93
Sb	ICP	PPM	5	2000	-5	-5	-5	6	-5	-5
Sb*	INAA	PPM	0.2	9999	0.4	1.3	-0.2	1.8	2.3	1
Sc	INAA	PPM	0.5	2000	0.7	12	2.8	6.2	3.2	1.9
Se	INAA	PPM	10	30000	-10	-10	-10	-10	-10	-10
Sm	INAA	PPM	0.2	2000	9.5	7.6	5.7	2.9	2.4	0.7
Sn*	ICP	PPM	20	2000	-20	24	-20	-20	-20	-20
Sn	INAA	PPM	200	30000	-200	-200	-200	-200	-200	-200
Sn**	XRF	PPM	1	10000						
Sr	ICP	PPM	1	2000	10	757	17	582	161	147
Ta	ICP	PPM	5	2000	-100	-100	-100	-100	-100	-100
Ta*	INAA	PPM	1	2000	2	1	3	-1	2	-1
Tb	INAA	PPM	1	30000	1	1	-1	-1	-1	-1
Te	AA	PPM	0.2	100	-0.2	-9	-0.2	0.7	-0.2	-9
Te	ICP	PPM	25	2000	-25	-25	-25	-25	-25	-25
Te	INAA	PPM	20	2000	-20	-20	-20	-20	-20	-20
Th	INAA	PPM	0.5	3000	12	1.9	19	2.5	16	4.2
Ti	ICP	PCT	0.01	10	0.06	0.47	0.03	0.23	0.09	0.07
U	INAA	PPM	0.5	2000	5	2.1	7.7	1	7.4	1.6
V	ICP	PPM	2	2000	-2	266	-2	46	16	22
W	ICP	PPM	20	2000	-20	-20	-20	-20	-20	-20
W*	INAA	PPM	2	30000	-2	29	-2	4	-2	-2
Y	ICP	PPM	5	2000	23	29	25	-5	5	-5
Yb	INAA	PPM	5	2000	-5	-5	-5	-5	-5	-5
Zn*	ICP	PPM	2	20000	68	160	50	48	15	46
Zn	INAA	PPM	200	30000	-200	-200	-200	-200	-200	-200
Zr	ICP	PPM	5	2000	36	6	56	7	19	6
Zr*	INAA	PPM	500	10000	-500	-500	-500	-500	-500	-500

LAND SELECTION UNIT 6

SAMPLE	3961	3989	2238-1	2238-2	2240-1	2240-2	3988
SIO2	71.8	66.2	74.1	75.8	65.1	64.7	63.9
AL2O3	13.8	16.7	13.1	13	16.4	16.3	15.9
FE2O3	0.40	1.62	0.86	0.66	1.88	1.82	2.05
FEO	1.2	1.0	0.5	0.5	1.5	1.5	1.9
MGO	0.44	1.02	0.17	0.18	1.21	1.22	1.9
CAO	1.63	3.42	0.74	0.71	3.89	3.92	4.19
NA2O	3.96	5.62	4.71	4.57	4.84	4.87	4.44
K2O	4.03	3.28	4.65	4.48	3.47	3.34	3.64
TIO2	0.239	0.367	0.157	0.111	0.429	0.448	0.465
P2O5	0.08	0.13	0.03	0.03	0.16	0.16	0.22
MNO	0.06	0.09	0.04	0.04	0.11	0.1	0.11
LOI	0.25	0.35	0.3	0.35	0.4	0.3	0.8
SUM	97.9	99.8	99.4	100.4	99.4	98.7	99.5
BA	1040	975	137	128	847	712	1050
RB	160	62	188	188	87	92	86
ZR	111	103	215	195	109	114	94
NB	24	14	41	43	17	21	20
Y	11	<10	57	34	<10	16	<10
SR	278	1310	27	11	1220	1180	1050
CR	<10	<10	<10	<10	<10	<10	<10
CIPW NORMS							
Quartz	29.39	13.71	27.98	30.57	15.00	14.98	14.01
Corundum	0.16	0.00	0.00	0.00	0.00	0.00	0.00
Orthoclase	24.39	19.49	27.74	26.45	20.71	20.06	21.79
Albite	34.32	47.81	40.23	38.64	41.37	41.88	38.06
Anorthite	7.75	10.71	0.88	1.73	12.91	12.96	12.87
Wollastonite	0.00	0.00	0.59	0.00	0.00	0.00	0.00
Diopside	0.00	4.29	0.96	1.30	4.40	4.57	5.37
Hypersthene	2.75	0.62	0.00	0.08	1.66	1.63	3.49
Magnetite	0.59	2.36	1.26	0.96	2.75	2.68	3.01
Ilmenite	0.47	0.71	0.31	0.21	0.83	0.87	0.89
Apatite	0.19	0.30	0.07	0.07	0.37	0.38	0.52
SUM	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Au Discrim.	90	0	0	0	0	0	0

(Analyses by XRAL)



Granite
Granodiorite
Tonalite
Qtz Syen
Qtz Monzon
Qtz Monzodio
Qtz Diorite
Syenite
Monzonite
Monzodiorite
Diorite
50
40
30
20
10
0
0
10
20
30
40
50
60
70
80
90

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