Division of Geological & Geophysical Surveys

PUBLIC-DATA FILE 93-3

LAND SELECTION UNIT 3 (HEALY, MOUNT HAYES, TALKEETNA MOUNTAINS, AND GULKANA QUADRANGLES): REFERENCES, MAJOR OXIDE, AND GEOCHEMICAL DATA

by

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May 1993

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STATE OF ALASKA
DEPARTMENT OF NATURAL RESOURCES
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INTRODUCTION

This report covers Land Selection Unit 3 in south-central Alaska. It includes data compiled and used as part of a mineral evaluation of land remaining to be selected by the State of Alaska from its entitlement under the 1959 Alaska Statehood Act. The assessment was accomplished using previous publications and 2 days of field work by the authors in 1991.

Included herein is a select bibliography of geological literature, geochemical analyses and major oxide data with calculated normative minerals and gold discriminant values.

Normative minerals were calculated using the UAF/PETCAL program that is a modified version of a CIPW Normative calculation provided by the Nevada Geological Survey. The program is written in BASICA, and has been modified by L.E. Burns.

The discriminant scores presented in this report are a reflection of how similar the sampled rocks are to other systems which form 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 sampled 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 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.
5) Since gold deposits appear to be concentrated in the country rock just above a pluton or in the uppermost part of a pluton, and the areal extent of plutonic exposure generally increases with depth of a given pluton, a large, deeply eroded pluton would be less likely to host gold even if the pluton had a highly favorable score.

GEOLOGIC SUMMARY

Unit 3 encompasses almost 3.9 million acres in the Healy, Mt Hayes, Talkeetna Mountains, and Gulkana Quadrangles and includes lands along the Denali and Richardson Highways.

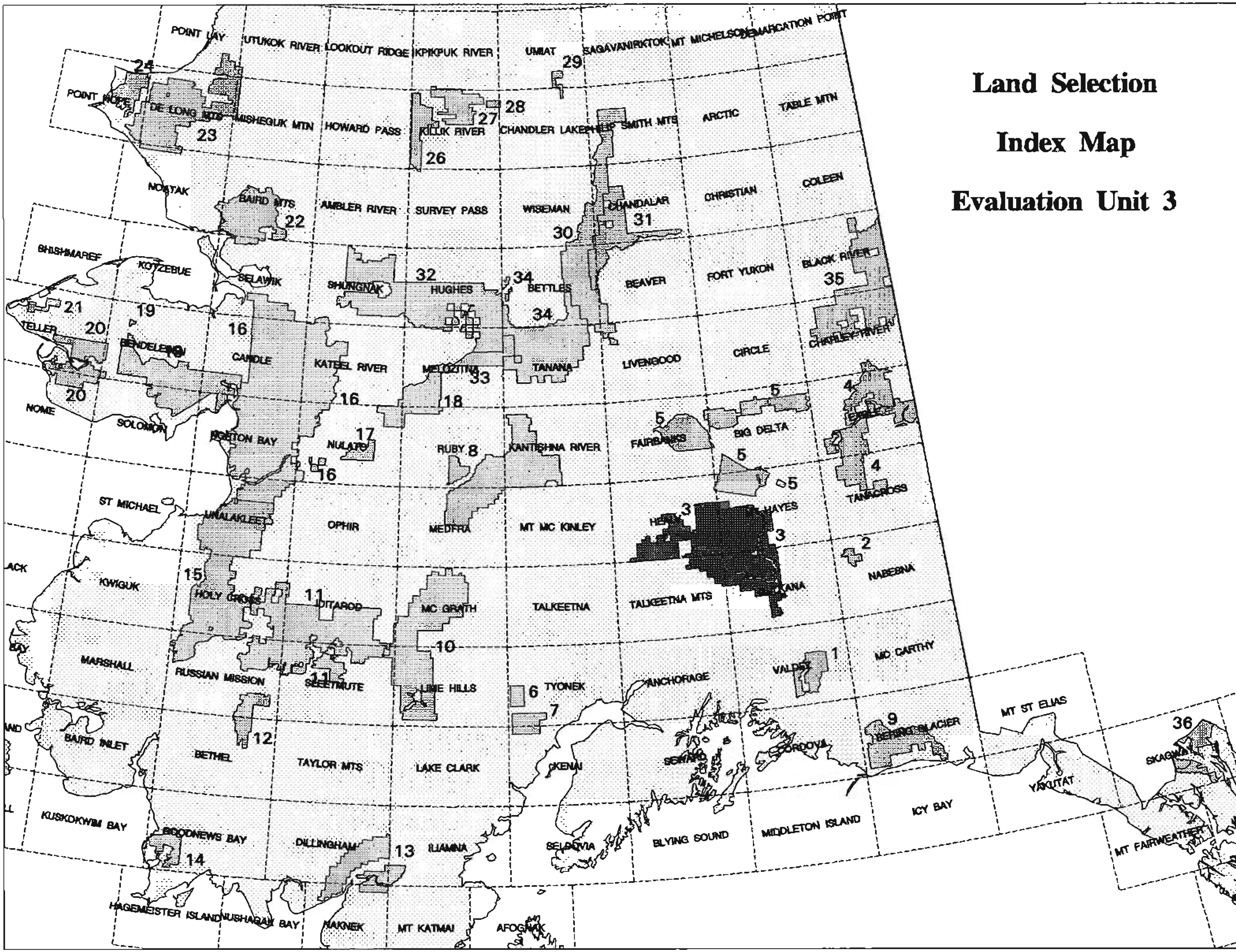
The area is composed of three major geologic terranes in fault contact with one another. From north to south these include (1) mid-Paleozoic to Precambrian schist terrane of sedimentary, volcanic, and igneous origin; (2) Jurassic and Cretaceous marine clastic sedimentary rocks of lower greenschist to amphibolite facies metamorphic grade intruded by plutonic rocks 55 to 70 million years ago, and (3) a Permian to Triassic volcanic arc of greeschist metamorphic grade.

The most significant known deposit within Unit 3, the Valdez Creek placer mine, has produced approximately 392,000 oz of gold and contains reserves of about 257,000 oz. Near the Valdez Creek mine, lode gold occurrences, thought to be formed by metamorphic processes, occur in a belt of rocks that extends over 100 mi across Unit 3. Both the Valdez Creek mine and the metamorphic gold belt lie with the Jura-Createceous geologic terrane of the western and east-central portion of the area. Other deposit types that may occur within this terrane are associated with intrusive rocks and include gold veins within granitic rocks, tin greisen, and copper-molybdenum porphyry deposits.

Permian to Triassic Tetelna-Ampitheater volcanic arc deposits along the southern and eastern portions of Unit 3 host numerous mineral occurrences and deposits. The Denali Copper prospect is reported to contain 2 million tons of 5 percent copper and up to 0.44 oz/ton silver. This sediment-hosted, basalt-related copper deposit suggests the potential for similar deposits with the region. Basalt-related deposits are indicated by numerous basalt-hosted copper occurrences, prospects, and limited copper production. Copper-gold skarn potential is shown by the Zackly deposit with estimated inferred reserves of 1.25 million tons grading 2.6 percent copper and 0.2 oz/ton gold. Copper, gold, and platinum occurrences within ultramafic rocks in the region indicate a potential for magmatic sulfide deposits and platinum-gold placers.

In addition there is evidence that polymetal massive sulfide veins and porphyry copper deposits may also occur here. Several polymetal massive sulfide occurrences just north of the unit suggest the potential for this type of deposit within the schist terrane along the northern part of Unit 3.

Land Selection Index Map Evaluation Unit 3



GEOCHEMICAL ANALYSES OF ROCK SAMPLES

Sample Id.	Au	Ir	Ag	Zn	Mo	Ni	Co	Cd	As	Sb	Fe	Se
Analy Meth	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA
Units	PPB	PPB	PPM	PPM	PPM	PPM	PPM	PPM	PPM	PPM	PCT	PPM
Lower Limit	5	100	5	200	2	20	10	10	1	0.2	0.5	10
Upper Limit	10000	1000	100	20000	20000	20000	20000	2000	10000	5000	10	2000
91BT 131	<5	<100	<5	<200	<2	52	12	<10	2	0.4	3.3	<10
91BT 132	<5	<100	<5	<200	<2	53	16	<10	3	0.2	4.9	<10
91BT 133	<5	<100	<5	<200	<2	<20	<10	<10	4	0.8	1.2	<10
91BT 135	<5	<100	<5	<200	<2	<20	<10	<10	15	0.9	1.7	<10
91BT 136	5930	<100	100	540	11	57	<10	<43	10000	47.8	4.3	<21
91BT 137	340	<100	12	<200	<2	<20	<10	<10	10000	3.7	1.1	<10
91BT 138	1360	<100	<5	<200	4	<20	21	<25	10000	4.6	1.9	<10
91BT 139	76	<100	<11	<200	<5	87	<10	<25	7810	9.2	1.1	<25
91BT 141	<5	<100	<5	<200	<2	<20	<10	<10	97	0.8	2.2	<10
91BT 142	<5	<100	<5	<200	7	35	<10	<10	56	3.6	1.3	<10
91BT 145	29	<100	<5	<200	<2	<20	<10	<10	34	3.7	4.4	<10
91BT 146	<5	<100	<5	<200	<2	<20	<10	<10	18	1.2	<0.5	<10
91BT 147	9	<100	<5	<200	<2	<20	18	<10	20	2.6	4.8	<10
91BT 151	<5	<100	<5	<200	<2	67	19	<10	15	2	4.5	<10
91BT 152	10	<100	<5	<200	<2	40	17	<10	23	1.9	5.7	<10
91BT 153	<5	<100	<5	<200	6	<20	16	<10	29	3.7	3	<10
91BT 155	<5	<100	<5	<200	5	<20	<10	<10	11	3.7	1.1	<10
91BT 156	<5	<100	<5	<200	<2	<20	<10	<10	7	1.1	3.3	<10
91BT 157	<5	<100	<5	<200	2	<20	<10	<10	18	50.8	0.6	<10
91BT 159	<5	<100	<5	290	<2	<20	<10	<10	13	4.8	1.1	<10
91BT 161B	<5	<100	<5	<200	<2	<20	<10	<10	8	0.7	0.5	<10
91BT 163	<5	<100	<5	<200	2	<20	<10	<10	6	0.7	<0.5	<10
91KC 29	5	<100	<5	<200	<2	<20	<10	<10	23	1	1.1	<10
91KC 30	5	<100	<5	<200	<2	<20	<10	<10	36	1.4	0.9	<10
91KC 32	5500	<100	100	570	15	<43	<10	<44	10000	217	4.2	<22
91KC 33	240	<100	<5	<200	11	100	<10	<47	10000	28.6	6.8	<23
91KC 34	<5	<100	<5	420	<2	<20	17	93	639	2.3	5.5	<10
91KC 35	6	<100	8	<200	<2	<20	<10	<10	107	0.9	0.7	<10
91KC 36	937	<100	<5	<200	5	<20	24	<28	10000	2.7	2.4	<10
91KC 43	12	<100	<5	<200	12	38	31	<10	159	20	6.8	<10
91KC 45	<5	<100	<5	<200	<2	37	<10	<10	74	19	10	<10
91KC 47	<5	<100	<5	<200	<2	65	25	<10	21	1.1	6.2	<10
91SL 04	<5	<100	<5	<200	<2	<20	<10	<10	24	1	1	<10
91SL 05B	<5	<100	<5	<200	<2	45	18	<10	10	1	5.5	<10
91SL 06C	<5	<100	<5	<200	4	<20	<10	<10	15	2	1.2	<10
91SL 07	<5	<100	<5	<200	<2	82	31	<10	26	1.7	6.6	<10
91SL 10	<5	<100	<5	<200	14	<20	<10	<10	77	2.8	1.8	<10
91SL 12	48	<100	<5	<200	<2	37	22	<10	14	2.1	5	<10
91SL 15	<5	<100	<5	320	<2	43	58	<10	7	1	10	<10
91SL 19	<2300	<9	<9	<9	<430	<4900	<680	<9	<310	<23	<9	<9

Sample Id.	Ta	Ba	Cr	Sn	W	Cs	La	Ce	Sm	Eu	Tb	Yb
Analy Meth	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA
Units	PPM	PPM	PPM	PPM	PPM	PPM	PPM	PPM	PPM	PPM	PPM	PPM
Lower Limit	20	100	50	200	2	1	5	10	0.2	2	1	5
Upper Limit	2000	20000	20000	20000	2000	10000	10000	10000	2000	2000	2000	2000
91BT 131	<20	1600	170	<200	<2	5	14	32	4.3	<2	<1	<5
91BT 132	<20	1900	160	<200	<2	7	27	67	11	<2	3	<5
91BT 133	<20	1800	<50	<200	<2	3	32	68	5.4	<2	<1	<5
91BT 135	<20	1600	56	<200	<2	3	31	69	6.8	<2	<1	<5
91BT 136	<88	<230	<130	<660	<20	<1	<5	<36	0.6	<2	<1	14
91BT 137	<20	300	<50	<200	<9	1	<5	<10	0.6	<2	<1	<5
91BT 138	<52	530	<50	<200	<11	1	<5	<21	0.3	<2	<1	<5
91BT 139	<94	280	<170	<940	<4	<1	<5	<41	1.5	3	<1	<5
91BT 141	<20	1000	<50	<200	<2	<1	7	11	2.6	<2	<1	<5
91BT 142	<20	2500	66	<200	<2	<1	9	23	2.9	<2	<1	<5
91BT 145	<20	730	160	<200	4	2	15	24	3.6	<2	<1	<5
91BT 146	<20	140	<50	<200	3	<1	<5	<10	0.2	<2	<1	<5
91BT 147	<20	600	160	<200	<2	<1	12	<10	3.5	<2	<1	<5
91BT 151	<20	3200	190	<200	<2	2	21	45	4.5	<2	<1	<5
91BT 152	<20	1200	170	<200	<2	4	24	49	5.7	<2	2	<5
91BT 153	<20	1700	<50	<200	<2	2	21	52	5	<2	<1	<5
91BT 155	<20	4800	56	<200	<2	1	21	50	3.7	<2	<1	<5
91BT 156	<20	3400	<50	<200	<2	1	21	49	6	<2	<1	<5
91BT 157	<20	<100	<50	<200	<2	<1	<5	<10	1.4	<2	<1	<5
91BT 159	<20	4000	<50	<200	<2	<1	39	77	11	<2	2	<5
91BT 161B	<20	<100	<50	<200	<2	1	<5	20	3	<2	1	<5
91BT 163	<20	1400	<50	<200	<2	13	<5	22	1.3	<2	<1	<5
91KC 29	<20	680	<50	<200	<2	1	14	27	3.7	<2	1	<5
91KC 30	<20	1200	<50	<200	<2	1	37	83	8.6	<2	2	6
91KC 32	<89	<230	<130	<680	<21	<1	<5	<36	0.4	<2	<1	16
91KC 33	<99	<250	<140	<730	<22	<1	<5	<40	1	<2	<1	22
91KC 34	<20	480	<50	<200	<2	3	27	55	9.2	3	3	8
91KC 35	<20	1600	64	<200	<2	4	25	49	2.6	<2	<1	<5
91KC 36	<58	2200	87	<420	<13	2	<5	<23	1	<2	<1	15
91KC 43	<20	7400	69	<200	4	<1	35	93	10	<2	1	<5
91KC 45	<20	930	110	<200	<2	3	12	<10	2.9	<2	<1	<5
91KC 47	<20	1300	300	<200	<2	<1	29	65	7.7	<2	1	<5
91SL 04	<20	250	<50	<200	<2	<1	23	64	5.3	<2	<1	6
91SL 05B	<20	2000	280	<200	<2	12	20	44	4.4	<2	<1	<5
91SL 06C	<20	640	<50	<200	<2	2	21	65	4.7	<2	1	<5
91SL 07	<20	660	310	<200	<2	<1	19	33	7.6	2	<1	<5
91SL 10	<20	2000	97	<200	<2	<1	7	21	3.6	<2	<1	<5
91SL 12	<20	1400	76	<200	5	1	16	26	4.1	<2	<1	<5
91SL 15	<20	240	74	<200	<2	2	9	24	7.3	<2	2	<5
91SL 19	<9	<9	<15000	<9	<560	<150	<99	4870	<5.1	<200	<78	<570

Sample Id.	Lu	Sc	Hf	Ta	Th	U	Na	Br	Rb	Zr	Ag	Bi
Analy Meth	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	ICP	AA
Units	PPM	PPM	PPM	PPM	PPM	PPM	PCT	PPM	PPM	PPM	PPM	PPM
Lower Limit	0.5	0.5	2	1	0.5	0.5	0.05	1	10	500	0.5	1
Upper Limit	2000	2000	2000	2000	2000	2000	10	1000	10000	10000	50	2000
91BT 131	<0.5	11	3	<1	5.2	2.1	1	<1	94	<500	<0.5	<1
91BT 132	<0.5	15	4	1	5.7	5.2	1	<1	100	<500	<0.5	<1
91BT 133	<0.5	3.9	9	2	14	5.7	2.4	<1	170	<500	<0.5	<1
91BT 135	<0.5	7.1	9	2	7.7	4.1	2.2	<1	87	950	<0.5	<1
91BT 136	1.1	1.4	<4	<1	<1.6	<1.9	<0.44	90	49	<500	50	99
91BT 137	<0.5	2.2	<2	<1	1.2	<0.5	<0.19	22	53	<500	13.7	11
91BT 138	<0.5	2.1	<2	<1	1.6	<1.1	<0.24	36	32	<500	8.3	25
91BT 139	<1.1	1.4	<5	<1	<1.8	<1.1	<0.05	28	<43	<1300	5.6	<1
91BT 141	<0.5	7.8	2	<1	1.5	1.9	1	<1	30	<500	<0.5	<1
91BT 142	<0.5	13	4	<1	1.6	5.2	1.4	<1	22	<500	0.5	<1
91BT 145	<0.5	19	5	<1	3.5	2.5	1.8	<1	74	<500	<0.5	<1
91BT 146	<0.5	<0.5	<2	<1	<0.5	<0.5	0.05	<1	14	<500	<0.5	<1
91BT 147	0.6	19	<2	<1	3.2	2	2.1	<1	34	<500	<0.5	<1
91BT 151	<0.5	17	3	<1	6.2	1.9	1.3	<1	66	<500	<0.5	<1
91BT 152	<0.5	19	<2	<1	6.3	2.7	1.1	<1	97	<500	<0.5	<1
91BT 153	<0.5	19	2	1	4.1	6.1	1.3	<1	91	<500	<0.5	<1
91BT 155	<0.5	7.1	5	1	2.8	3.7	0.34	<1	25	<500	0.9	<1
91BT 156	<0.5	7.6	5	2	3.6	2	0.82	<1	44	750	<0.5	<1
91BT 157	<0.5	1.7	<2	<1	0.9	<0.5	0.29	2	<10	<500	<0.5	<1
91BT 159	<0.5	6.3	8	1	12	5.5	2.6	<1	76	<500	<0.5	<1
91BT 161B	<0.5	1.3	7	5	34	11	1.9	<1	410	<500	<0.5	<1
91BT 163	<0.5	0.9	<2	9	7.8	2.7	2.1	<1	240	<500	<0.5	<1
91KC 29	0.5	2.3	14	3	12	5	2.8	<1	160	<500	<0.5	<1
91KC 30	<0.5	2.6	17	2	10	4.4	2.7	<1	180	750	<0.5	<1
91KC 32	1.5	<0.5	<4	<1	<1.6	<1.9	<0.84	87	42	<500	50	12
91KC 33	1.7	<0.5	<5	<1	2	<2.1	<0.45	107	<38	<1100	5.5	5
91KC 34	1.2	15	8	<1	5.6	1.8	2.2	2	41	<500	<0.5	<1
91KC 35	<0.5	2.6	6	1	27	9.4	2.2	<1	190	<500	<0.5	<1
91KC 36	<0.5	4.8	<2	<1	2.5	<1.3	<0.28	40	100	<500	7.6	19
91KC 43	0.6	21	4	2	3	4.2	1.2	<1	47	<500	<0.5	<1
91KC 45	<0.5	10	4	<1	2.4	1.7	0.85	<1	33	<500	<0.5	<1
91KC 47	<0.5	18	4	<1	7.1	3.1	2.1	<1	110	<500	<0.5	<1
91SL 04	<0.5	0.9	12	3	15	5.4	2.8	<1	160	<500	<0.5	<1
91SL 05B	<0.5	18	3	<1	7.1	2.6	2	<1	86	<500	<0.5	<1
91SL 06C	<0.5	1.5	9	3	13	4.8	2.4	<1	200	<500	<0.5	<1
91SL 07	0.6	20	5	<1	3.8	<0.5	1.7	<1	38	<500	1.1	2
91SL 10	<0.5	12	3	<1	1.1	3.1	1.2	<1	43	<500	0.9	<1
91SL 12	<0.5	15	3	<1	3.8	2.3	1.4	<1	150	<500	<0.5	<1
91SL 15	0.9	39	6	1	<0.5	<0.5	1.5	<1	34	<500	2.5	<1
91SL 19	<93	<63	<580	<95	<160	<100	<3.2	<280	<4000	<9	0.6	<1

Sample Id.	Cu	Zn	Mo	Ni	Co	Cd	As	Sb	Fe	Mn	Te	Ba
Analy Meth	ICP	ICP	ICP	ICP	ICP	ICP	ICP	ICP	ICP	ICP	ICP	ICP
Units	PPM	PPM	PPM	PPM	PPM	PPM	PPM	PPM	PCT	PPM	PPM	PPM
Lower Limit	1	2	1	1	1	2	5	5	0.01	5	25	5
Upper Limit	20000	20000	20000	20000	20000	2000	2000	2000	10	20000	2000	2000
91BT 131	83	97	18	67	14	<2	12	<5	3.57	676	<25	646
91BT 132	80	140	4	53	15	<2	12	<5	5.38	1324	<25	1362
91BT 133	18	50	2	6	<1	<2	<5	<5	1.14	121	<25	1273
91BT 135	25	36	<1	18	5	<2	16	<5	1.47	166	<26	1246
91BT 136	257	473	<1	3	<1	18.2	2000	29	5.09	23	<25	89
91BT 137	26	35	<1	2	<1	<2	2000	<5	1.07	17	<25	233
91BT 138	335	37	<1	8	17	2.4	2000	<5	1.81	10	<25	358
91BT 139	56	13	<1	<1	1	<2	2000	10	0.74	7	<25	326
91BT 141	19	35	<1	9	2	<2	127	<5	2.12	343	<25	658
91BT 142	20	56	3	9	3	<2	69	<5	1.11	249	<25	1863
91BT 145	48	39	<1	11	6	<2	41	40	3.53	524	<25	554
91BT 146	10	9	<1	6	3	<2	7	9	0.22	104	<25	82
91BT 147	81	42	<1	37	14	<2	6	<5	4.39	668	<25	474
91BT 151	46	95	<1	49	18	<2	6	<5	4.57	2671	<25	2000
91BT 152	48	163	<1	61	10	<2	70	7	6.06	574	<25	1019
91BT 153	54	52	2	38	15	<2	37	<5	2.74	613	<25	1488
91BT 155	11	31	4	5	<1	<2	10	<5	0.84	67	<25	1437
91BT 156	20	76	<1	10	6	<2	12	<5	2.73	980	<25	302
91BT 157	19	36	<1	12	4	<2	17	38	0.79	448	<25	105
91BT 159	22	72	<1	6	2	<2	23	<5	0.95	184	<25	2000
91BT 161B	3	53	<1	3	<1	<2	41	<5	0.48	28	<25	44
91BT 163	12	21	<1	2	1	<2	20	<5	0.24	70	<25	937
91KC 29	4	13	<1	2	<1	<2	11	<5	0.68	15	<25	455
91KC 30	12	35	25	11	2	<2	33	<5	0.95	59	<25	849
91KC 32	157	455	4	4	2	3.4	2000	182	4.56	16	<25	78
91KC 33	36	37	4	4	10	<2	2000	34	7.12	17	<25	135
91KC 34	70	397	<1	43	17	74.2	682	<5	4.36	881	<25	411
91KC 35	8	19	<1	4	<1	<2	128	<5	0.73	71	<25	1187
91KC 36	378	38	<1	10	21	12.7	2000	5	2.12	19	<25	408
91KC 43	79	99	5	24	19	<2	185	7	6.14	336	<25	90
91KC 45	132	148	3	23	4	<2	76	<5	10	324	<25	818
91KC 47	22	106	<1	55	19	<2	33	<5	5.83	1000	<25	986
91SL 04	8	142	<1	4	2	<2	31	<5	0.78	27	<25	158
91SL 05B	113	131	<1	78	17	<2	25	<5	5.82	412	<25	1347
91SL 06C	5	56	1	3	<1	<2	13	<5	0.86	25	<25	496
91SL 07	33	102	10	77	33	<2	91	10	9.6	1381	<25	762
91SL 10	26	100	11	27	9	<2	94	8	2.3	872	<25	2000
91SL 12	300	19	2	40	21	<2	19	<5	5.69	333	<25	124
91SL 15	324	132	8	56	42	<2	98	18	10	1918	36	159
91SL 19	25	14	<1	<1	2	<2	92	2000	0.17	39	<25	<5

Sample Id.	Cr	V	Sn	W	Li	Ga	La	Ta	Ti	Al	Mg	Ca
Analy Meth	ICP	ICP	ICP	ICP	ICP	ICP	ICP	ICP	ICP	ICP	ICP	ICP
Units	PPM	PPM	PPM	PPM	PPM	PPM	PPM	PPM	PCT	PCT	PCT	PCT
Lower Limit	2	2	20	20	2	10	5	5	0.01	0.01	0.01	0.01
Upper Limit	20000	2000	2000	2000	2000	2000	2000	2000	10	10	10	10
91BT 131	126	151	<20	<20	30	12	14	<5	0.3	2.86	1.12	2.91
91BT 132	109	191	<20	<20	61	15	23	<5	0.31	6.38	1.55	2.26
91BT 133	18	11	<20	<20	16	16	16	<5	0.11	2.31	0.08	0.28
91BT 135	51	35	<20	<20	15	17	22	<5	0.15	3.07	0.34	0.41
91BT 136	45	<2	24	<20	63	<10	<5	<5	0.06	0.91	0.06	0.02
91BT 137	34	5	<20	<20	17	<10	<5	<5	0.07	1.17	0.08	0.01
91BT 138	37	<2	<20	<20	10	<10	<5	<5	0.05	0.72	0.03	0.01
91BT 139	12	<2	<20	<20	117	<10	6	<5	0.04	0.56	0.02	0.01
91BT 141	17	64	<20	<20	14	<10	<5	<5	0.21	2.9	0.39	1.68
91BT 142	35	213	<20	<20	7	<10	6	<5	0.2	2.63	0.27	0.9
91BT 145	78	179	<20	<20	8	14	<5	<5	0.39	2.38	1.48	4.82
91BT 146	9	20	<20	<20	<2	<10	<5	<5	0.01	0.88	0.03	0.38
91BT 147	76	229	<20	<20	4	15	7	<5	0.36	2.28	1.38	6
91BT 151	120	179	<20	<20	43	15	16	<5	0.37	6.57	1.49	0.2
91BT 152	132	187	<20	<20	149	11	21	<5	0.51	8.4	1.36	0.23
91BT 153	55	274	<20	<20	35	11	19	<5	0.26	4.86	1.12	0.09
91BT 155	31	116	<20	<20	21	11	17	<5	0.18	1.55	0.17	0.04
91BT 156	19	91	<20	<20	34	11	19	<5	0.3	3.02	1.19	10
91BT 157	32	15	<20	<20	9	<10	<5	<5	0.05	0.86	0.09	0.19
91BT 159	12	5	<20	<20	10	13	25	<5	0.08	1.42	0.02	0.03
91BT 161B	6	<2	<20	<20	16	21	<5	<5	0.03	1.98	<0.01	0.01
91BT 163	6	4	<20	<20	6	21	<5	<5	0.02	2.67	0.01	0.55
91KC 29	7	<2	<20	<20	3	22	7	<5	0.13	1.81	<0.01	0.09
91KC 30	14	9	<20	<20	5	21	29	<5	0.14	1.95	<0.01	0.1
91KC 32	18	<2	<20	<20	74	<10	<5	<5	0.04	0.83	0.04	0.02
91KC 33	24	<2	23	<20	59	<10	<5	<5	0.02	0.88	0.04	0.02
91KC 34	28	51	<20	<20	34	19	12	<5	0.39	4.27	0.67	4.22
91KC 35	12	7	<20	<20	10	15	17	<5	0.11	2.18	0.14	0.07
91KC 36	54	8	<20	<20	8	<10	<5	<5	0.12	1.08	0.08	0.02
91KC 43	45	207	<20	<20	12	<10	8	<5	0.82	1.84	0.16	6.92
91KC 45	100	129	<20	<20	28	<10	10	<5	0.22	3.72	0.61	0.13
91KC 47	150	115	<20	<20	46	16	14	<5	0.63	5.47	2.52	3.38
91SL 04	16	<2	<20	<20	11	21	13	<5	0.07	1.84	0.02	0.07
91SL 05B	162	175	<20	<20	47	14	15	<5	0.4	6.49	1.77	0.93
91SL 06C	7	<2	<20	<20	91	19	13	<5	0.08	2.26	0.01	0.04
91SL 07	177	142	<20	<20	16	37	28	<5	1.15	10	5.65	7.93
91SL 10	96	197	<20	<20	14	15	<5	<5	0.29	4.89	0.52	2.48
91SL 12	82	209	<20	<20	8	10	6	<5	0.49	4.76	1.93	2.83
91SL 15	65	432	45	<20	17	54	8	<5	1.76	6.4	3.29	8.09
91SL 19	7	4	<20	<20	<2	<10	<5	<5	<0.01	0.39	0.06	0.66

Sample Id.	Na	K	Nb	Sr	Y	Zr	Pb	Sn
Analy Meth	ICP	ICP	ICP	ICP	ICP	ICP	AA	XRF
Units	PCT	PCT	PPM	PPM	PPM	PPM	PPM	PPM
Lower Limit	0.01	0.01	5	1	5	5	2	5
Upper Limit	10	10	2000	2000	2000	2000	10000	10000
91BT 131	1.46	1.1	8	201	8	<5	5	<5
91BT 132	1.3	1.12	6	153	31	<5	5	<5
91BT 133	3.17	1.25	12	102	12	210	7	7
91BT 135	2.9	1.55	16	132	8	98	7	<5
91BT 136	<0.01	0.5	<5	4	<5	<5	1196	5
91BT 137	<0.01	0.69	<5	3	<5	<5	422	18
91BT 138	<0.01	0.54	<5	10	<5	<5	315	8
91BT 139	<0.01	0.3	<5	7	<5	<5	116	8
91BT 141	1.22	0.76	<5	144	7	27	6	<5
91BT 142	1.57	0.83	<5	109	8	49	4	<5
91BT 145	2.21	1.31	37	261	<5	103	7	<5
91BT 146	<0.01	0.38	<5	13	<5	<5	<2	8
91BT 147	2.59	0.9	13	280	9	7	3	<5
91BT 151	1.53	1.09	14	70	13	70	18	<5
91BT 152	1.19	0.85	15	89	19	77	11	6
91BT 153	1.47	1.21	6	59	15	74	11	<5
91BT 155	0.25	0.99	11	39	14	108	4	<5
91BT 156	1.06	0.72	28	653	15	99	4	<5
91BT 157	0.37	0.06	<5	53	<5	7	67	<5
91BT 159	4.33	1.21	23	126	16	193	18	<5
91BT 161B	2.73	1.51	27	5	17	98	30	17
91BT 163	2.81	1.8	12	390	<5	15	4	220
91KC 29	3.44	1.8	25	14	7	47	4	<5
91KC 30	3.4	1.23	21	36	12	36	6	<5
91KC 32	<0.01	0.35	<5	6	<5	<5	1296	<5
91KC 33	<0.01	0.4	<5	4	<5	11	75	18
91KC 34	2.47	0.34	16	424	25	<5	22	<5
91KC 35	2.4	1.36	16	106	<5	50	6	11
91KC 36	<0.01	1.63	6	41	<5	<5	239	19
91KC 43	1.34	1.92	22	167	15	59	11	<5
91KC 45	0.89	1.1	15	42	11	55	9	6
91KC 47	2.63	1.19	23	407	16	118	10	<5
91SL 04	3.45	1.51	28	8	16	182	9	<5
91SL 05B	2.48	1.11	22	201	5	<5	4	<5
91SL 06C	3	1.31	25	15	15	178	7	<5
91SL 07	4.27	1.78	25	542	47	186	4	16
91SL 10	2.33	1.49	6	148	16	29	4	<5
91SL 12	2.27	2.16	8	164	10	11	4	<5
91SL 15	2.42	0.42	24	141	35	57	4	10
91SL 19	<0.01	0.07	<5	131	<5	8	83	<5

DETECTION LIMIT AND ANALYTICAL METHOD

ELEMENT		LOWER DETECTION LIMIT		EXTRACTION	METHOD
Au	Gold	5	PPB		Inst. Neutron Activ.
Ir	Iridium	100	PPB		Inst. Neutron Activ.
Ag	Silver	5	PPM		Inst. Neutron Activ.
Zn	Zinc	200	PPM		Inst. Neutron Activ.
Mo	Molybdenum	2	PPM		Inst. Neutron Activ.
Ni	Nickel	20	PPM		Inst. Neutron Activ.
Co	Cobalt	10	PPM		Inst. Neutron Activ.
Cd	Cadmium	10	PPM		Inst. Neutron Activ.
As	Arsenic	1	PPM		Inst. Neutron Activ.
Sb	Antimony	0.2	PPM		Inst. Neutron Activ.
Fe	Iron	0.5	PCT		Inst. Neutron Activ.
Se	Selenium	10	PPM		Inst. Neutron Activ.
Te	Tellurium	20	PPM		Inst. Neutron Activ.
Ba	Barium	100	PPM		Inst. Neutron Activ.
Cr	Chromium	50	PPM		Inst. Neutron Activ.
Sn	Tin	200	PPM		Inst. Neutron Activ.
W	Tingsten	2	PPM		Inst. Neutron Activ.
Cs	Cesium	1	PPM		Inst. Neutron Activ.
La	Lanthanum	5	PPM		Inst. Neutron Activ.
Ce	Cerium	10	PPM		Inst. Neutron Activ.
Sm	Samarium	0.2	PPM		Inst. Neutron Activ.
Eu	Europium	2	PPM		Inst. Neutron Activ.
Tb	Terbium	1	PPM		Inst. Neutron Activ.
Yb	Ytterbium	5	PPM		Inst. Neutron Activ.
Lu	Lutetium	0.5	PPM		Inst. Neutron Activ.
Sc	ScandiumScandium	0.5	PPM		Inst. Neutron Activ.
Hf	Hafnium	2	PPM		Inst. Neutron Activ.
Ta	Tantalum	1	PPM		Inst. Neutron Activ.
Th	Thorium	0.5	PPM		Inst. Neutron Activ.
U	Uranium	0.5	PPM		Inst. Neutron Activ.
Na	Sodium	0.05	PCT		Inst. Neutron Activ.
Br	Bromine	1	PPM		Inst. Neutron Activ.
Rb	Rubidium	10	PPM		Inst. Neutron Activ.
Zr	Zirconium	500	PPM		Inst. Neutron Activ.
Ag	Silver	0.5	PPM	HF-HNO3-HClO4-HCl	Ind. Coupled Plasma
Cu	Copper	1	PPM	HF-HNO3-HClO4-HCl	Ind. Coupled Plasma
Zn	Zinc	2	PPM	HF-HNO3-HClO4-HCl	Ind. Coupled Plasma
Mo	Molybdenum	1	PPM	HF-HNO3-HClO4-HCl	Ind. Coupled Plasma
Ni	Nickel	1	PPM	HF-HNO3-HClO4-HCl	Ind. Coupled Plasma
Co	Cobalt	1	PPM	HF-HNO3-HClO4-HCl	Ind. Coupled Plasma
Cd	Cadmium	2	PPM	HF-HNO3-HClO4-HCl	Ind. Coupled Plasma
As	Arsenic	5	PPM	HF-HNO3-HClO4-HCl	Ind. Coupled Plasma
Sb	Antimony	5	PPM	HF-HNO3-HClO4-HCl	Ind. Coupled Plasma
Fe	Iron	0.01	PCT	HF-HNO3-HClO4-HCl	Ind. Coupled Plasma
Mn	Manganese	5	PPM	HF-HNO3-HClO4-HCl	Ind. Coupled Plasma
Te	Tellurium	25	PPM	HF-HNO3-HClO4-HCl	Ind. Coupled Plasma
Ba	Barium	5	PPM	HF-HNO3-HClO4-HCl	Ind. Coupled Plasma
Cr	Chromium	2	PPM	HF-HNO3-HClO4-HCl	Ind. Coupled Plasma
V	Vanadium	2	PPM	HF-HNO3-HClO4-HCl	Ind. Coupled Plasma
Sn	Tin	20	PPM	HF-HNO3-HClO4-HCl	Ind. Coupled Plasma
W	Tungsten	20	PPM	HF-HNO3-HClO4-HCl	Ind. Coupled Plasma
Li	Lithium	2	PPM	HF-HNO3-HClO4-HCl	Ind. Coupled Plasma
Ga	Gallium	10	PPM	HF-HNO3-HClO4-HCl	Ind. Coupled Plasma
La	Lanthanum	5	PPM	HF-HNO3-HClO4-HCl	Ind. Coupled Plasma
Ta	Tantalum	5	PPM	HF-HNO3-HClO4-HCl	Ind. Coupled Plasma
Ti	Titanium	0.01	PCT	HF-HNO3-HClO4-HCl	Ind. Coupled Plasma
Al	Aluminum	0.01	PCT	HF-HNO3-HClO4-HCl	Ind. Coupled Plasma
Mg	Magnesium	0.01	PCT	HF-HNO3-HClO4-HCl	Ind. Coupled Plasma
Ca	Calcium	0.01	PCT	HF-HNO3-HClO4-HCl	Ind. Coupled Plasma
Na	Sodium	0.01	PCT	HF-HNO3-HClO4-HCl	Ind. Coupled Plasma
K	Potassium	0.01	PCT	HF-HNO3-HClO4-HCl	Ind. Coupled Plasma
Nb	Niubium	5	PPM	HF-HNO3-HClO4-HCl	Ind. Coupled Plasma
Sr	Strontium	1	PPM	HF-HNO3-HClO4-HCl	Ind. Coupled Plasma
Y	Yttrium	5	PPM	HF-HNO3-HClO4-HCl	Ind. Coupled Plasma
Zr	Zirconium	55	PPM	HF-HNO3-HClO4-HCl	Ind. Coupled Plasma
Pb	Leak	2	PPM	HNO3-HCl Hot Extr.	Atomic Absorption
Bi	Bismuth	1	PPM	HNO3-HCl Hot Extr.	Atomic Absorption
Hg	Mercury	0.01	PPM	HNO3-HCl-SnSO4	Cold Vapour AA
B	Boron	10	PPM	NaOH Fusion	DC Plasma Emission
Te	Tellurium	0.2	PPM	Multi Acid - MIBK	Atomic Absorption
Sn	Tin	5	PPM		X-Ray Fluorescence

Samples were analy-ed by Bondar-Clegg & Company Ltd., 130 Pemberton Ave., North Vancouver, B.C. V7P 2R5 (604)985-0681

LOCATION AND DESCRIPTION OF ROCK SAMPLES

SAMPLE	LONG (W)	LAT (N)	BRIEF FIELD DESCRIPTION
91BT 131	148.078	63.153	Iron-stained, leucocratic, biotite K-spar paragneiss and schist,very heterogeneous, some sulfides
91BT 132	148.078	63.153	High-graded chips over 40 meters of ferruginous, biotite schist, minor pyrite
91BT 133	148.069	63.166	Light gray, very fine grained quartz porphyry dike, 2 m wide,trending N55W
91BT 135	148.069	63.166	Several felsic dikes intruding schist, N56-64W trend
91BT 136	148.017	63.137	Chip/channel sample of Deadman Prospect, a prominant N55-70W trending quartz vein 1 to 2.5 m wide and tracable for at least 200 m. Aspy as masses and grains in qtz, minor py. Near vein margin is greenish fine-grained 'andesite' dike
91BT 137	148.018	63.137	
91BT 138	148.018	63.137	
91BT 139	148.018	63.137	
91BT 141	148.111	63.021	Chip sample of hornfels, breccia, and quartz vein rubble
91BT 142	148.098	63.019	Chip sample of hornfels rubble with conspicuous ferricrete gossan and minor quartz veining
91BT 145	147.735	63.104	Silicic, pyrite-rich Tertiary felsite
91BT 146	147.735	63.104	Ferricrete-stained quartz vein (20 cm wide) cutting Tertiary felsite
91BT 147	147.735	63.104	Pyritic quartz vein swarm in Tertiary felsite
91BT 151	149.269	63.031	Black, sheared meta argillite of Kahiltna Terrane
91BT 152	149.225	63.038	Phyllitic, light green, tuffaceous shale interbedded with dark gray carbon-rich, silty siltstone/shale
91BT 153	149.224	63.038	Shale and minor sandstone with abundant sulfur staining and ferricrete coating
91BT 155	149.223	63.063	Hydrothermally altered, sheared metasandstone and slate of Kahiltna Terrane with disseminated pyrite (3-15%) and quartz veining
91BT 156	149.223	63.063	Sheared meta sandstone, strong sulfur staining
91BT 157	149.421	63.099	Quartz vein at antimony prospect
91BT 159	149.421	63.099	Felsic dike at east end of prospect pit at antimony prospect
91BT 161B	148.400	63.134	Felsite dike
91BT 163	148.260	63.033	Pegmatite dike (1/2 m thick) trends N10W for about 30 m
91KC 29	148.045	63.152	Dark orange weathering felsite dike with finely disseminated aspy?,
91KC 30	148.045	63.152	Felsite dike with finely disseminated aspy?
91KC 32	148.056	63.157	Vuggy quartz with arsenopyrite in frostboil
91KC 33	148.056	63.157	Clay-altered zone with disseminated arsenopyrite (to 20%) along margin of 7 m wide felsite dike in quartz biotite gneiss, abundant quartz veining
91KC 34	148.056	63.157	Iron-stained gneiss near felsite dike
91KC 35	148.053	63.162	Pegmatite dike

91KC 36	148.028	63.146	1-2 m wide drusy quartz vein (N 50 W), 200 m long, with aspy, intruding bte qtz schist; andesite, felsite, and bte granite dikes in area. Deadman Prospect
91KC43	149.251	63.047	Yellow-orange salts on joint surface (N50W strike) of ferruginous black argillite
91KC 45	149.422	63.101	Ferruginous black shale with quartz vein near antimony prospect
91KC 47	148.228	63.062	Mafic, aphanitic dike, 7 m wide, N 68 W strike, intrudes biotite granite
91SL 04	148.080	63.148	Pyritic quartz vein
91SL 05B	148.080	63.148	Pyritic quartz veining in schist/gneiss
91SL 06C	148.080	63.148	Aplite dike, N 87 E, 10 m wide
91SL 07	147.735	63.104	
91SL 10	148.051	63.052	Ferruginous black argillite, hornfels zone
91SL 12	147.738	63.104	Pyritic quartz vein
91SL 15	149.208	63.081	Ferruginous argillite
91SL 19	148.224	63.065	High grade of antimony ore from prospect

MAJOR OXIDE ANALYSES

		SIO2	AL2O3	FE2O3	FEO	MGO	CAO	NA2O	K2O	TIO2	P2O5	MNO	BA PPM	RB PPM	ZR PPM	CR PPM	SR PPM	Y PPM	NB PPM	LOI	SUM
1	91SL2	74.5	12.9	0.315	0.4	0.12	0.89	3.28	4.45	0.103	0.03	0.03	1350	138	73	16	215	<10	14	0.70	98.0
2	91SL13	64.1	14.8	0.909	7.2	2.22	0.55	1.31	2.89	0.782	0.25	0.34	3860	108	248	79	82	38	15	1.62	98.3
3	91SL16	68.7	14.4	0.515	2.2	0.59	1.62	3.78	4.03	0.381	0.09	0.06	1830	133	252	16	354	38	21	1.16	98.1
4	91SL17	53.8	18.6	1.126	5.7	3.42	9.18	3.06	1.06	0.698	0.19	0.16	428	26	78	46	653	36	28	0.93	98.7
5	91SL18	74.9	12.6	0.412	0.7	0.13	0.86	3.03	5.21	0.148	0.03	0.03	1090	167	125	12	129	19	<10	0.39	98.7
6	91KC30	69.9	14.9	0.833	0.6	0.01	0.27	4.32	5.35	0.287	0.04	0.03	1060	104	788	<10	53	57	36	1.31	98.2
7	91KC37	75.3	13.2	0.089	0.1	0.03	0.53	3.54	4.99	0.115	0.02	0.07	648	170	73	12	141	20	<10	0.47	98.6
8	91KC38	56.5	15.8	1.208	5.5	4.37	6.59	3.11	1.94	0.905	0.41	0.13	758	55	196	85	446	<10	25	1.00	98.3
9	91KC39	58.8	17.7	1.03	4.4	3	6.14	3.96	1.47	0.726	0.21	0.1	727	55	105	38	595	12	18	0.85	99.1
10	91BT130	68.6	15	1.419	1.9	0.03	0.41	4.43	5.3	0.316	0.04	0.05	1410	104	829	10	67	34	31	0.93	98.9
11	91BT134	52.6	15.7	1.182	7.8	4.2	6.84	3.1	1.89	1.72	0.68	0.17	1070	40	240	90	734	28	50	1.23	98.2
12	91BT140	54	15.7	1.376	6.5	5.08	6.61	3.03	2.1	1.42	0.48	0.14	1010	57	220	136	647	16	34	1.16	98.6
13	91BT143	67.9	14.8	1.116	2.1	1.34	3.41	3.67	2.69	0.508	0.19	0.07	1030	71	161	22	376	14	<10	0.70	98.9
14	91BT144	68.8	14.9	0.947	2	1.22	3.28	3.77	2.89	0.475	0.17	0.07	976	83	147	21	403	48	<10	0.47	99.4
15	91BT148	49.1	15	2.279	6.3	7.31	8.37	2.63	1.19	1.39	0.46	0.16	555	40	110	279	653	17	38	3.23	98.3
16	91BT160	75.6	12.6	0.273	0.6	0.07	0.71	3.66	4.72	0.096	0.02	0.04	512	187	90	13	61	53	<10	0.54	99.1
17	91BT161	49.5	15.4	2.633	5.9	3.9	5.71	4.03	1.91	1.54	0.61	0.17	1240	87	204	48	757	18	23	6.00	98.2
18	91BT162	64.1	18.5	0.403	1.5	0.49	3.13	4.46	4.44	0.303	0.12	0.03	3730	61	118	<10	1390	26	10	0.47	98.7
19	91BT164	75.3	12.5	0.424	0.5	0.07	0.73	3.19	5.22	0.098	0.02	0.02	442	144	98	11	49	25	10	0.47	98.7

*Analyses by X-RAY Assay Laboratories, 1885 Leslie Street, Don Mills, Ontario M3B 3J4 (418)445-5755

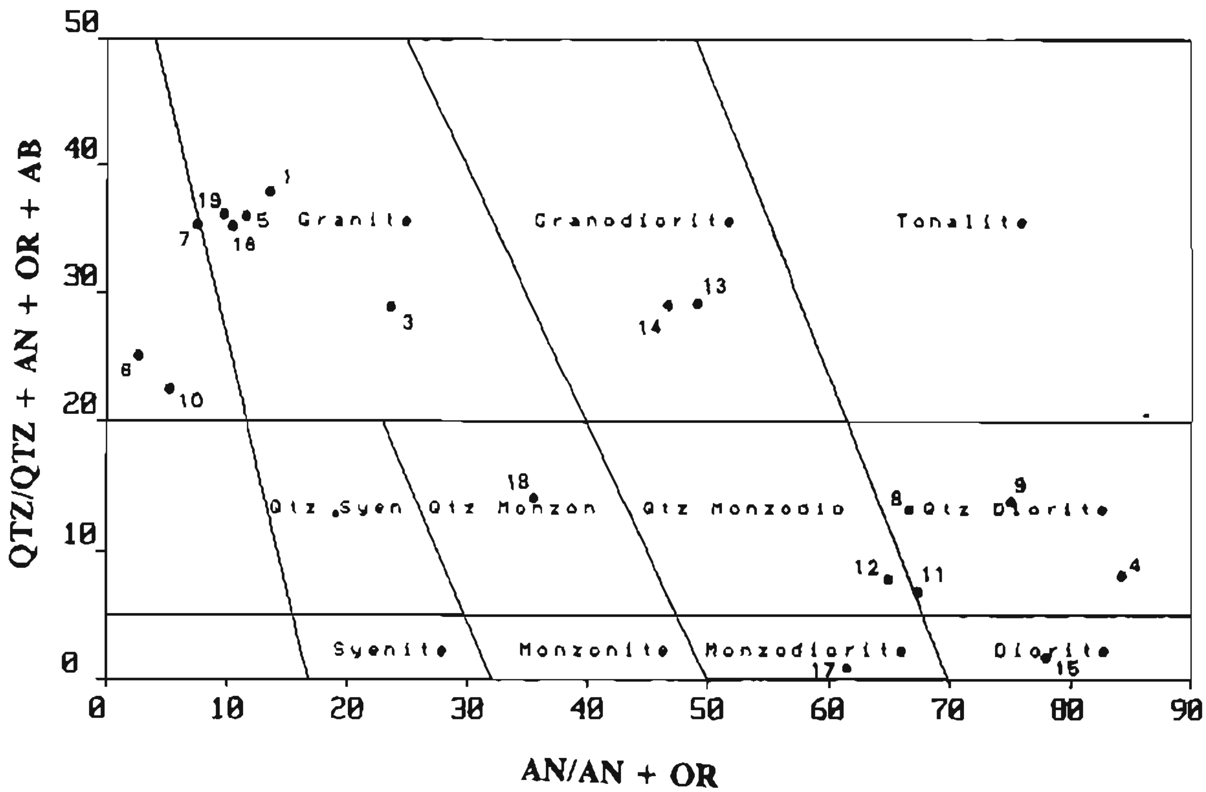
**XRF W.R.A. sums include all elements determined. For summation, elements are calculated as oxides.

NORMATIVE MINERALS AND GOLD DISCRIMINANT

		NORMATIVE MINERALS											
		QTZ	CO	OR	AB	AN	DIOP	HYP	MT	HEM	ILM	AP	AU DISC*
1	91SL2	37.341	1.176	27.103	28.605	4.349		0.680	0.478		0.196	0.072	0
2	91SL13	38.028	9.559	17.910	11.625	1.150		18.188	1.384		1.554	0.607	
3	91SL16	26.759	1.131	24.711	33.188	7.730		4.735	0.782		0.749	0.216	98
4	91SL17	6.200		6.457	26.692	34.933	8.889	13.318	1.689		1.371	0.454	100
5	91SL18	35.741	0.494	31.399	26.147	4.151		1.100	0.606		0.291	0.071	2
6	91KC30	24.675	1.665	32.747	37.862	1.117		0.026	1.234	0.009	0.571	0.096	
7	91KC37	35.180	1.081	30.091	30.567	2.550		0.118	0.133		0.233	0.047	
8	91KC38	9.708		11.883	27.277	24.279	5.596	16.666	1.819		1.792	0.984	100
9	91KC39	11.184		8.905	34.351	26.839	2.453	12.818	1.531		1.421	0.499	100
10	91BT130	21.422	1.360	32.121	38.444	1.818		2.005	2.112		0.623	0.095	17
11	91BT134	4.942		11.648	27.357	24.345	5.315	19.562	1.784		3.407	1.642	100
12	91BT140	5.623		12.867	26.584	23.886	5.613	19.405	2.075		2.796	1.152	100
13	91BT143	27.078	0.108	16.253	31.751	16.029		5.681	1.660		0.990	0.450	60
14	91BT144	26.828	0.014	17.332	32.374	15.388		5.342	1.398		0.925	0.400	72
15	91BT148	1.067		7.466	23.625	27.188	11.048	22.165	3.510		2.803	1.131	100
16	91BT160	34.880	0.231	28.350	31.478	3.447		0.995	0.398		0.174	0.047	86
17	91BT161	0.879		12.362	37.348	20.032	5.414	15.040	4.177		3.204	1.547	100
18	91BT162	13.509	0.978	26.918	38.716	15.127		3.288	0.595		0.585	0.285	100
19	91BT164	35.645	0.329	31.453	27.522	3.560		0.630	0.621		0.194	0.047	0

* Gold discriminant scores are described within the text of this report.

NORMATIVE MINERAL RATIOS (after Streckeisen and LeMaitre, 1979)



LOCATION AND DESCRIPTION OF MAJOR OXIDE SAMPLES

		LONG(W)	LAT(N)	BRIEF FIELD DESCRIPTION
1	91SL2	148.045	63.152	Biotite granite dike
2	91SL13	149.257	63.060	Weathered granite, very marginal major oxide
3	91SL16	149.176	63.022	Granite
4	91SL17	148.260	63.037	Quartz diorite
5	91SL18	148.225	63.065	Granite
6	91KC30	148.045	63.152	Felsite dike
7	91KC37	148.028	63.146	Garnet-bearing aplite dike
8	91KC38	148.040	63.043	Fine-grained biotite quartz diorite
9	91KC39	148.040	63.043	Medium-grained hornblende biotite quartz diorite
10	91BT130	148.088	63.138	Fine-grained alaskite dike
11	91BT134	148.069	63.166	Fresh, dark gray porphyritic mafic dike
12	91BT140	148.018	63.137	Greenish, fine-grained hornblende biotite 'andesite' dike
13	91BT143	148.098	63.019	Medium- to coarse-grained biotite granodiorite
14	91BT144	148.040	63.043	Medium-grained biotite granodiorite
15	91BT148	147.735	63.104	Green-gray, fine-grained, biotite hornblende diorite dike
16	91BT160	148.285	63.117	Medium-grained, equigranular, biotite granite
17	91BT161	149.176	63.022	Fine-grained diorite dike
18	91BT162	148.260	63.037	Slightly foliated, biotite quartz monzonite
19	91BT164	148.225	63.065	Equigranular biotite granite

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