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LAND SELECTION UNIT 5 (BIG DELTA, MOUNT HAYES, FAIRBANKS QUADRANGLES): REFERENCES, MAJOR OXIDE, AND GEOCHEMICAL DATA

by

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INTRODUCTION

This report covers Land Selection Unit 5 in east-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 Newberry and Clautice 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

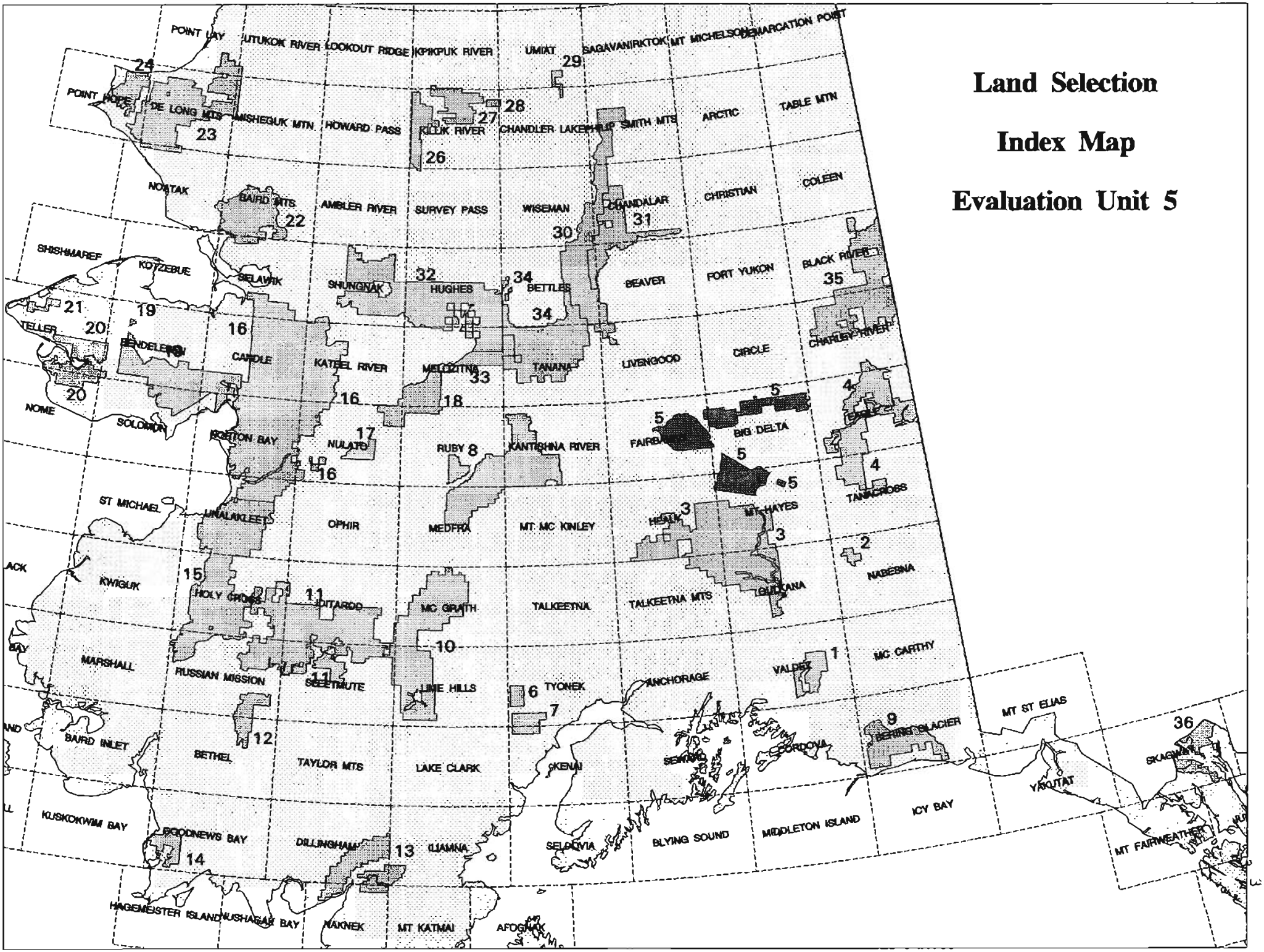
Unit 5 encompasses 2 million acres in parts of the Big Delta, Mount Hayes, and Fairbanks Quadrangles. Bedrock in the northern areas consists dominantly of greenschist-facies metamorphic rocks, which have been intruded by numerous granitic plutons and are overlain by a thrust klippe of ultramafic rocks. The greenschist unit is thought to be mid-Paleozoic in age (about 320 to 480 million years old); parts of it are interpreted as correlative with volcanogenic massive sulfide-bearing units of the Alaska Range. Two main types of granitic plutons, granodiorite of mainly Late Cretaceous age (about 65 to 98 million years old), and granite of early Tertiary age (about 40 to 65 million years old) are present in the area. The ultramafic rock is thought to be a remnant of an extensive thrust complex; it consists of harzburgite and dunite and is about 1 km thick.

Most of the southern parts of Unit 5 are composed of Quaternary alluvial deposits (Nenana gravels and younger stream sedimentary deposits). Only small areas of bedrock (Cretaceous plutons as discussed above) are exposed.

Unit 5 has numerous gold, arsenic, bismuth, tungsten, and tin anomalies in rocks, stream sediments, and panned concentrates. These anomalies are mostly present around the granitic plutons. Major oxide rock geochemistry has been used to show that several plutons in the region have a strong potential for lode gold associations, and several have a good potential for tin greisen systems. Other geochemical indicators suggest that Unit 5 could potentially contain volcanogenic massive sulfide deposits (VMS) as well.

Although no gold placer production has occurred within Unit 5, gold placers could well be present, since placer gold production has occurred immediately south o and north of the study area; additionally the presence of favorable gold -related plutons indicates possible sources for potential gold placers.

Potential ore deposit types that were considered but rejected because of lack of geochemical indicators, critical rock types, and extremely small areas of favorability areas include volcanogenic-type Cleary Sequence gold, tungsten-gold skarns, lead-zinc-silver skarns, prophyry molybdenum deposits and chromite, nickel, and gold deposits potentially associated with ultramafic rocks. The general lack of carbonate rocks restricts the possible size of skarn deposits. Thus, although some skarn prospects are known, the likelihood of large deposits is small.


Land Selection
Index Map
Evaluation Unit 5
POINT LAY
UTUKOK RIVER
LOOKOUT RIDGE
KIPIKPUK RIVER
UMIAT
SAGAVANIRKTOK
MT MICHELSON
DEMARCATION POINT
POINT HOPE
DE LONG MTS
MISHEGUK MTN
HOWARD PASS
KILLIK RIVER
CHANDLER LAKE
PHILIP SMITH MTS
ARCTIC
TABLE MTN
NOATAK
BAIRD MTS
AMBLER RIVER
SURVEY PASS
WISEMAN
CHANDALAR
CHRISTIAN
COLEEN
SHISHMAREF
KOTZEBUE
SELAWIK
SHUNGNAK
HUGHES
BETTLES
BEAVER
FORT YUKON
BLACK RIVER
TELLER
BENDELEBEN
CANDLE
KATEEL RIVER
MELOZITNA
TANANA
LIVENGOOD
CIRCLE
CHARLEY RIVER
NOME
SOLOMON
GOLOVIN BAY
NULATO
RUBY
KANTISHNA RIVER
FAIRBANKS
BIG DELTA
TANACROSS
ST MICHAEL
UNALAKLEET
OPHIR
MEDFRA
MT MC KINLEY
HEALY
MT HAYES
KWIGUK
HOLY CROSS
IDITAROD
MC GRATH
TALKEETNA
TALKEETNA MTS
GULKANA
NABESNA
MARSHALL
RUSSIAN MISSION
SLEETMUTE
LIME HILLS
TYONEK
ANCHORAGE
VALDEZ
MC CARTHY
BAIRD INLET
BETHEL
TAYLOR MTS
LAKE CLARK
SKENAI
SEWARD
CORDOVA
BERING GLACIER
MT ST ELIAS
YAKUTAT
KUSKOKWIM BAY
GOODNEWS BAY
DILLINGHAM
ILIAMNA
SELDOVIA
BLYING SOUND
MIDDLETON ISLAND
ICY BAY
MT FAIRWEATHER
HAGEMEISTER ISLAND
NUSHAGAK BAY
NAKNEK
MT KATMAI
AFOGNAK
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MAJOR OXIDE ANALYSES (WT%)

	SIO2	AL2O3	FE2O3	FEO	MGO	CAO	NA2O	K2O	TIO2	P2O5	MNO	BA ppm	RB ppm	ZR ppm	SR ppm	Y ppm	NB ppm	LOI	SUM*
1 91RN01	56.8	16.0	2.040	5.3	3.86	6.38	2.59	3.16	0.910	0.30	0.15	1360	118	175	591	17	13	1.39	99.7
2 91RN06	64.0	15.3	1.053	4.1	2.27	4.65	2.66	3.19	0.652	0.14	0.12	1540	117	165	410	22	27	0.77	99.6
3 91RN08	59.9	17.2	1.313	5.0	2.68	6.45	3.05	1.53	0.833	0.17	0.11	1240	47	150	453	27	16	0.93	99.9
4 91RN10	56.8	16.3	1.132	6.9	3.72	7.47	2.18	2.03	0.993	0.20	0.15	1450	73	174	516	17	32	0.31	99.2
5 91RN14	67.5	14.7	0.646	3.0	1.26	3.31	2.75	4.04	0.475	0.12	0.08	1540	190	201	389	36	22	0.77	99.3
6 91RN17	74.3	12.6	0.231	0.8	0.44	0.88	2.20	5.56	0.161	0.04	0.04	1140	232	88	241	<10	19	0.77	98.3
7 91RN23	74.3	12.3	0.319	1.0	0.13	0.68	3.79	4.97	0.106	0.02	0.03	144	541	217	<10	212	59	0.77	98.7
8 91RN26	66.9	15.3	0.618	2.8	1.34	3.66	3.05	3.15	0.467	0.14	0.09	1530	135	167	350	32	15	0.70	98.8
9 91RN27	67.3	15.3	0.841	2.6	1.27	3.12	3.17	3.58	0.425	0.13	0.09	1000	148	158	407	50	20	0.77	99.1
10 91RN28	68.0	15.6	0.842	2.5	1.17	3.57	3.16	3.44	0.420	0.14	0.08	1190	141	182	390	33	11	0.54	100.0
11 91KC02	66.3	15.2	0.484	3.2	1.34	4.01	2.64	3.66	0.472	0.10	0.06	1610	150	161	333	28	<10	0.93	99.0
12 91KC03	65.9	15.5	0.880	3.5	1.83	4.17	2.86	3.40	0.556	0.14	0.10	1520	139	147	403	12	27	0.85	100.3
13 91KC08	75.6	13.1	0.274	0.5	0.14	0.34	4.07	4.72	0.036	0.02	0.02	130	324	70	<10	101	28	0.54	99.5
14 91KC09	74.8	13.4	0.424	0.5	0.27	0.76	3.52	5.15	0.089	0.09	0.04	334	298	54	61	11	23	0.47	99.7
15 91KC10	67.6	14.9	0.737	2.9	1.27	3.37	2.71	4.03	0.471	0.12	0.08	1630	178	218	411	26	17	0.47	99.3
16 91KC11	68.0	14.6	0.746	3.0	1.31	3.17	2.75	3.99	0.489	0.12	0.08	1510	182	221	387	35	17	0.62	99.5
17 91KC12	66.5	14.9	0.679	2.7	1.65	3.41	2.64	3.92	0.478	0.14	0.06	1200	175	153	424	31	11	1.23	98.8
18 91KC14	72.9	13.0	0.366	1.2	0.51	1.55	2.40	5.26	0.183	0.05	0.04	913	224	94	214	16	27	0.62	98.4
19 91KC15	75.1	12.4	0.342	0.7	0.27	0.65	2.95	5.14	0.104	0.03	0.05	450	272	93	80	18	<10	0.77	98.7
20 91KC20	74.6	12.3	0.379	1.0	0.14	0.59	3.58	5.27	0.104	0.02	0.03	112	550	225	<10	187	65	0.39	98.7
21 91KC22	67.2	15.3	0.707	2.9	1.33	3.84	3.07	2.55	0.479	0.14	0.10	837	114	164	327	44	14	0.54	98.7
22 91KC25	66.1	14.5	1.128	2.8	1.45	2.28	3.50	3.97	0.667	0.32	0.09	2180	319	292	829	33	36	1.23	98.8
23 91KC25	70.8	13.9	0.724	1.4	0.66	1.29	3.35	4.63	0.379	0.13	0.04	1590	260	233	666	16	22	1.00	98.8

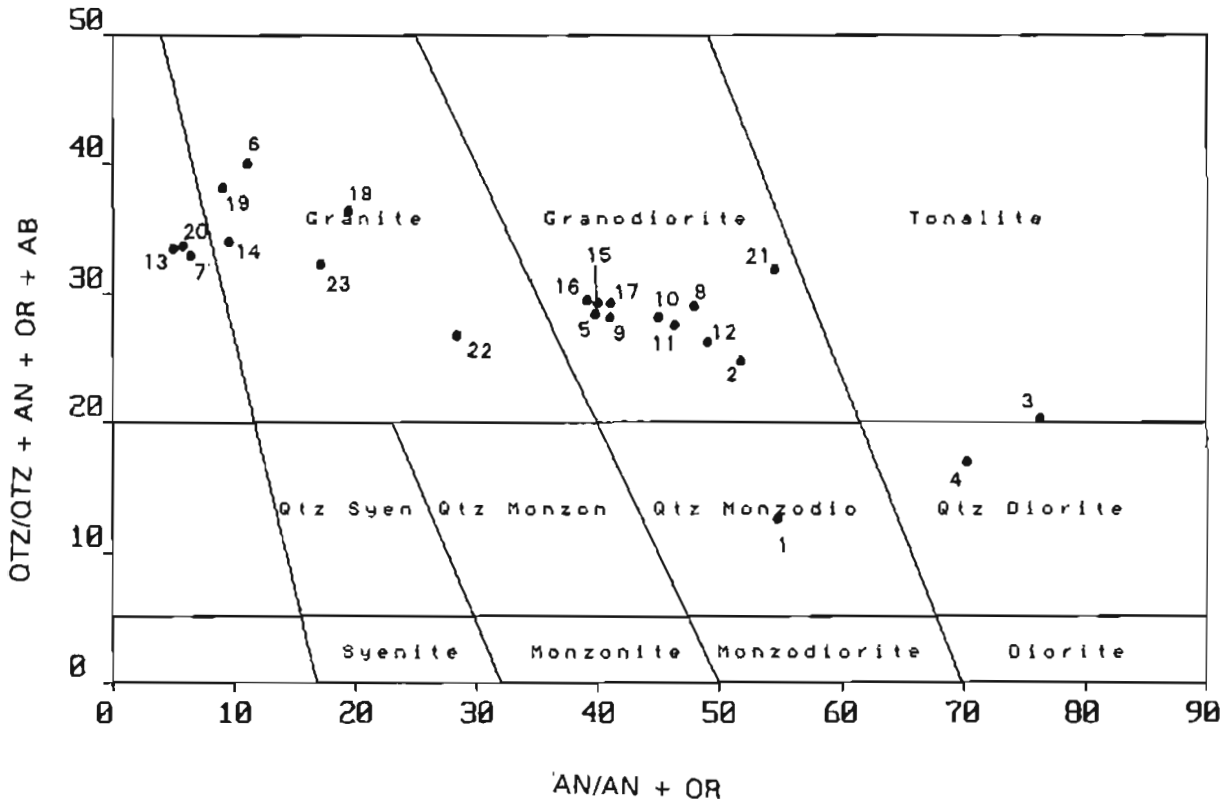
* XRF W.R.A. sums include all elements determined. For summation, elements are calculated as oxides.

NORMATIVE MINERALS AND GOLD DISCRIMINANT SCORE

	QTZ	COR	OR	AB	AN	DIOP	HYP	MT	ILM	AP	AU DISC. SCORE*
1 91RN01	9.713		19.154	22.478	23.283	5.869	13.985	3.034	1.773	0.713	100.00
2 91RN06	21.509		19.208	22.934	20.773	1.492	10.936	1.556	1.262	0.330	100.00
3 91RN08	16.577		9.203	26.270	29.238	1.826	12.938	1.938	1.610	0.431	100.00
4 91RN10	12.430		12.256	18.846	29.318	5.988	17.387	1.677	1.927	0.473	100.00
5 91RN14	25.988	0.074	24.390	23.772	15.975		7.639	0.957	0.922	0.284	99.96
6 91RN17	38.359	1.500	33.783	19.140	4.220		2.244	0.344	0.314	0.095	77.43
7 91RN23	32.032		30.077	32.841	1.917	1.216	1.190	0.474	0.206	0.047	93.80
8 91RN26	26.486	0.568	19.088	26.464	17.682		7.552	0.919	0.910	0.332	99.95
9 91RN27	25.901	0.868	21.625	27.418	14.954		6.857	1.246	0.825	0.308	98.91
10 91RN28	26.216	0.528	20.549	27.028	16.979		6.332	1.234	0.806	0.328	98.24
11 91KC02	25.172		22.190	22.918	19.304	0.366	8.174	0.720	0.920	0.238	100.00
12 91KC03	23.071		20.328	24.484	19.642	0.301	9.487	1.291	1.068	0.328	100.00
13 91KC08	33.071	0.734	28.224	34.848	1.575		1.030	0.402	0.690	0.047	42.02
14 91KC09	32.728	0.880	30.819	30.162	3.223		1.183	0.623	0.171	0.211	0.00
15 91KC10	26.256	0.244	24.253	23.353	16.229		7.384	1.088	0.911	0.283	99.84
16 91KC11	26.872	0.286	23.996	23.681	15.208		7.629	1.101	0.945	0.283	99.87
17 91KC12	25.835	0.463	23.861	23.010	16.484		8.064	1.014	0.935	0.334	99.73
18 91KC14	35.000	0.677	31.892	20.836	7.555		3.020	0.545	0.357	0.119	73.54
19 91KC15	36.979	0.894	31.077	25.538	3.099		1.633	0.507	0.202	0.071	29.24
20 91KC20	32.385		31.772	30.905	1.967	0.765	1.396	0.561	0.202	0.047	84.14
21 91KC22	28.569	0.864	15.436	26.610	18.579		7.630	1.050	0.932	0.322	99.97
22 91KC25A	23.672	1.101	24.234	30.591	9.526		7.114	1.690	1.309	0.765	98.22
23 91KC25B	30.390	1.381	28.118	29.130	5.705		3.150	1.079	0.740	0.309	30.38

* An explanation of the gold discriminant score is found within the text of this report.

NORMATIVE MINERAL RATIOS (after Streckeisen and LeMaitre, 1979)



TRACE ELEMENT ANALYSES OF MAJOR OXIDE SAMPLES

	AU ppb FADCP	LI ppm ICP	BE ppm DCP	B ppm DCP	S ppm XRF	CL ppm XRF	SC ppm NA	V ppm DCP	CR ppm NA	CO ppm ICP	NI ppm ICP	CU ppm ICP	ZN ppm 1	GE ppm DCP	AS ppm NA	SE ppm NA	BR ppm NA	MO ppm ICP	PD ppb FADCP	AG ppm ICP	CD ppm ICP
91RN01	<1	18	4	39	<100	279	20.7	192	140	16	8	15.6	96.2	<10	2	<3	3	<1	<1	0.6	2
91RN06	1	12	4	18	<100	529	15.4	101	140	8	3	8.4	89.2	<10	1	<3	4	<1	1	<0.5	<1
91RN08	<1	<10	3	15	<100	749	17.7	104	130	11	4	11.0	79.7	16	<1	<3	2	<1	<1	<0.5	<1
91RN10	<1	15	3	44	<100	306	26.2	168	94	15	3	9.3	118.0	<10	4	<3	3	<1	<1	<0.5	<1
91RN14	<1	32	4	14	<100	157	10.7	60	150	5	5	3.8	62.8	<10	3	<3	3	<1	<1	<0.5	<1
91RN17	<1	34	3	18	<100	<100	1.5	17	170	<1	2	70.1	68.2	<10	47	<3	1	<1	1	<0.5	<1
91RN23	<1	79	10	16	<100	236	1.2	<10	150	<1	2	8.0	142.0	<10	1	<3	1	<1	<1	<0.5	<1
91RN26	2	18	2	16	<100	<100	9.8	58	140	5	4	4.0	69.1	<10	<1	<3	2	<1	<1	<0.5	<1
91RN27	3	27	3	14	<100	<100	8.5	54	150	4	3	5.2	71.0	<10	<1	<3	2	<1	<1	<0.5	<1
91RN28	<1	25	4	15	<100	<100	7.1	42	130	2	4	4.4	55.6	<10	<1	<3	1	<1	<1	<0.5	<1
91KC02	1	22	4	19	4400	397	8.8	60	120	5	3	41.2	44.2	<10	2	<3	2	<1	<1	<0.5	<1
91KC03	<1	24	4	18	245	485	11.7	70	130	7	4	10.9	67.7	<10	1	<3	2	<1	<1	<0.5	<1
91KC08	2	19	4	15	<100	<100	4.7	<10	180	<1	2	3.5	16.7	<10	22	<3	2	<1	<1	<0.5	<1
91KC09	1	<10	4	279	<100	<100	3.5	<10	150	<1	2	7.6	25.8	<10	8	<3	2	<1	2	<0.5	<1
91KC10	3	30	4	23	<100	203	10.1	57	140	4	3	4.1	57.9	<10	4	<3	2	<1	2	<0.5	<1
91KC11	3	28	6	24	<100	212	10.5	58	160	6	4	3.7	66.5	<10	1	<3	2	<1	2	<0.5	<1
91KC12	<1	21	5	24	<100	168	9.3	67	140	3	5	2.0	47.6	<10	2	<3	2	<1	1	<0.5	<1
91KC14	5	40	5	20	<100	<100	2.1	23	170	1	4	7.6	45.6	<10	8	<3	1	<1	<1	<0.5	<1
91KC15	4	38	5	24	<100	<100	1.5	<10	110	<1	2	6.3	23.6	<10	22	<3	1	<1	1	<0.5	<1
91KC20	3	120	16	56	<100	264	1.2	10	130	<1	2	5.9	138.0	<10	3	<3	2	<1	<1	<0.5	<1
91KC22	3	18	4	15	<100	<100	9.8	63	140	6	3	1.9	69.5	<10	<1	<3	2	<1	<1	<0.5	<1
91KC25A	<1	87	8	25	<100	212	6.1	51	140	3	5	4.8	77.8	<10	1	<3	1	<1	<1	<0.5	<1
91KC25B	15	40	6	28	<100	<100	3.8	29	130	2	2	39.5	41.9	<10	<1	<3	2	<1	<1	<0.5	<1

	SN ppm XRF	SB ppm NA	CS ppm NA	LA ppm NA	CE ppm NA	ND ppm NA	SM ppm NA	EU ppm NA	TB ppm NA	YB ppm NA	LU ppm NA	HF ppm NA	TA ppm NA	W ppm NA	PT ppb FADCP	PB ppm ICP	BI ppm ICP	TH ppm NA	U ppm NA
91RN01	12	1.0	6	40.1	75	33	6.2	1.3	0.6	2.0	0.31	4	<1	<3	<10	23	<3	13	3.0
91RN06	<10	0.3	4	35.1	62	25	4.4	1.1	0.5	1.9	0.29	4	<1	<3	<10	31	<3	15	3.8
91RN08	11	0.6	3	24.4	41	17	3.3	1.2	<0.5	1.5	0.25	3	<1	<3	<10	12	<3	6	1.4
91RN10	<10	0.8	2	31.6	59	27	5.1	1.3	0.5	2.3	0.37	4	<1	<3	<10	16	6	10	2.8
91RN14	<10	0.4	5	45.5	84	34	5.9	0.9	0.6	2.4	0.36	5	<1	<3	<10	18	<3	23	5.8
91RN17	13	0.7	9	33.0	56	17	2.2	0.6	<0.5	1.2	0.23	3	<1	<3	<10	36	<3	26	3.5
91RN23	15	0.6	13	49.8	114	60	13.7	0.3	2.7	12.4	1.96	8	5	<3	<10	45	<3	42	7.7
91RN26	12	<0.2	7	36.9	69	29	5.0	1.1	0.6	1.9	0.28	4	<1	<3	<10	22	<3	12	2.5
91RN27	11	<0.2	5	33.0	61	25	4.5	1.2	0.6	1.9	0.29	4	<1	<3	<10	21	<3	15	2.9
91RN28	16	<0.2	4	39.1	71	29	4.9	1.2	0.5	1.6	0.25	4	<1	<3	<10	22	<3	14	2.4
91KC02	13	0.4	5	36.2	64	23	4.0	1.0	0.5	1.9	0.28	3	<1	<3	<10	13	<3	16	4.3
91KC03	16	0.3	7	36.6	64	24	3.8	1.0	<0.5	1.4	0.22	3	1	<3	<10	17	<3	15	3.5
91KC08	<10	0.3	6	8.3	21	14	3.9	<0.2	1.4	5.6	0.86	3	2	<3	<10	46	<3	19	6.2
91KC09	16	2.8	32	8.6	19	11	2.5	0.3	0.5	2.4	0.40	2	3	11	<10	40	<3	20	7.1
91KC10	<10	0.5	4	49.1	88	35	6.0	0.9	0.6	2.2	0.33	4	<1	<3	<10	22	<3	21	4.5
91KC11	<10	0.5	7	46.5	87	34	6.2	1.0	0.7	2.6	0.40	5	1	<3	<10	24	<3	21	7.3
91KC12	16	0.7	8	35.7	62	24	4.1	1.0	<0.5	1.7	0.25	3	1	3	<10	13	<3	17	6.3
91KC14	<10	0.8	9	32.4	54	18	2.5	0.2	<0.5	1.7	0.30	3	2	<3	<10	34	<3	30	4.3
91KC15	12	6.4	8	33.0	56	18	2.7	0.3	<0.5	1.7	0.31	3	1	4	<10	42	<3	42	6.2
91KC20	16	0.5	15	52.7	126	58	13.2	0.3	2.8	12.4	1.86	9	5	6	<10	46	<3	49	12.7
91KC22	<10	<0.2	5	43.7	80	32	5.8	0.9	0.8	2.7	0.39	4	1	<3	<10	16	<3	15	3.0
91KC25A	<10	0.4	16	120.0	207	76	11.4	2.1	0.8	1.8	*INF	6	1	54	<10	24	4	33	11.1
91KC25B	16	0.4	7	84.3	150	50	7.5	1.3	0.5	1.6	INF	5	2	5	<10	19	<3	37	13.8

*INF - Composition makes detection impossible by this method

GEOCHEMICAL ANALYSES

	AU ppb NA	LI ppm ICP	BE ppm ICP	NA ppm NA	NA % ICP	MG % ICP	AL % ICP	P % ICP	K % ICP	CA % NA	CA % ICP	SC ppm NA	SC ppm ICP	TI % ICP	V ppm ICP	CR ppm NA	CR ppm ICP	MN % ICP	FE % NA	FE % ICP	CO ppm NA	CO ppm ICP
91KC01	<5	32	3.2	17000	2.27	2.62	9.11	0.12	3.28	3	5.05	16.8	19.1	0.60	158	130	135	0.10	4.3	5.70	18	27
91KC05	<5	16	2.4	24000	2.95	0.01	6.73	<0.01	3.98	<1	0.21	4.2	5.1	<0.01	<2	160	165	<0.01	0.9	1.32	<5	<1
91KC06	1300	254	1.8	8200	0.91	0.01	3.01	<0.01	1.88	<1	0.09	1.5	1.7	<0.01	<2	210	262	<0.01	0.4	0.52	<5	<1
91KC09	<5	34	3.5	18000	2.17	0.36	7.27	0.03	3.66	<1	1.49	4.4	5.2	0.16	21	150	133	0.03	1.3	1.77	<5	5
91KC15	<5	47	2.6	17000	1.99	0.12	6.58	<0.01	4.46	<1	0.48	1.3	1.6	0.06	2	130	119	0.03	0.7	0.96	<5	2
91KC16	<5	242	9.5	1700	0.49	0.61	13.20	0.03	7.23	<1	0.09	5.0	5.8	0.12	22	100	107	0.04	3.2	4.39	<5	6
91KC17	<5	52	2.8	<500	0.06	0.36	6.68	0.01	3.78	<1	0.02	1.9	2.0	0.10	12	210	209	<0.01	1.1	1.53	<5	2
91KC18	<5	86	1.3	<500	0.04	0.49	2.44	0.02	0.49	<1	0.08	3.2	2.7	0.14	15	180	159	0.06	2.6	3.13	<5	6
91KC19	<5	36	1.4	<500	0.03	0.21	2.72	0.02	0.17	1	2.94	5.3	5.5	0.23	34	170	185	0.05	5.1	6.69	<5	6
91KC21	<5	49	13.7	18000	2.26	0.88	7.86	0.08	4.69	1	1.52	8.6	9.6	0.45	61	100	88	0.05	2.4	3.25	10	17
91KC23	<5	34	2.0	20000	2.53	0.79	7.86	0.05	2.75	1	1.75	7.7	8.6	0.29	44	140	134	0.05	2.2	2.81	<5	7
91KC24	5	<1	<0.5	<500	0.04	0.03	0.32	<0.01	0.13	<1	0.08	0.3	<0.5	<0.01	<2	230	202	<0.01	0.5	0.62	<5	1
91KC26	<5	49	5.4	19000	2.51	0.37	7.38	0.05	4.20	<1	0.84	3.2	3.9	0.26	25	150	165	0.02	1.4	1.96	<5	5
91RN02	<5	5	<0.5	1000	0.13	0.02	0.45	<0.01	0.31	<1	0.02	0.2	<0.5	<0.01	<2	320	284	<0.01	0.3	0.33	<5	<1
91RN03	<5	<1	<0.5	1700	0.23	0.14	0.72	<0.01	0.23	<1	0.16	0.6	0.5	0.02	7	340	302	<0.01	0.5	0.62	<5	2
91RN04	<5	27	3.1	13000	1.84	4.72	7.88	0.12	0.86	5	8.73	26.3	27.6	0.99	248	180	156	0.16	8.4	9.48	40	50
91RN05	<5	24	3.5	17000	2.38	1.91	9.87	0.06	2.39	3	4.51	15.6	18.6	0.54	114	150	161	0.06	3.9	4.76	13	20
91RN07	<5	12	3.1	21000	2.75	1.28	8.98	0.05	3.16	1	3.34	12.6	14.4	0.43	78	130	128	0.03	2.3	2.81	<5	7
91RN09	<5	9	1.7	4500	0.62	6.25	6.04	0.03	0.46	7	10.80	42.8	45.0	0.35	262	150	133	0.18	8.0	9.00	37	36
91RN11	<5	18	3.8	13000	2.19	2.73	10.50	0.09	2.16	5	6.46	21.8	27.6	0.75	158	80	90	0.11	4.9	6.61	16	27
91RN12	<5	15	4.6	5000	0.67	2.62	10.30	0.08	1.60	7	10.70	20.5	22.0	0.77	154	230	212	0.12	6.1	6.87	27	37
91RN13	<5	69	5.0	8700	1.22	3.72	11.10	0.07	2.80	<1	0.85	25.1	27.6	0.99	207	180	166	0.11	7.5	9.26	26	37
91RN15	<5	27	3.8	18000	2.54	1.06	9.10	0.05	3.91	1	2.64	9.3	10.7	0.34	57	160	171	0.04	2.6	3.42	7	11
91RN18	<5	36	3.1	7400	1.08	0.16	6.98	<0.01	4.84	<1	0.08	1.7	2.0	0.07	10	190	179	0.01	1.1	1.42	<5	4
91RN19	<5	37	2.8	9600	1.32	0.17	6.93	<0.01	4.63	<1	0.09	2.1	2.2	0.06	9	170	147	0.01	0.8	0.98	<5	3
91RN20	<5	68	3.8	4900	0.66	1.39	6.23	0.06	2.60	1	0.95	10.8	11.9	0.57	119	210	153	0.05	3.4	4.38	11	19
91RN21	<5	44	2.0	<500	0.06	0.43	3.40	0.02	0.88	2	3.09	4.3	5.6	0.20	32	210	225	0.07	3.0	4.19	7	9
91RN22	<5	37	36.0	<500	0.06	3.17	3.93	0.03	0.12	8	15.20	5.4	4.8	0.13	32	60	56	2.10	7.3	9.05	31	30
91RN24	<5	48	13.8	17000	2.44	0.06	6.12	<0.01	3.29	<1	0.49	2.3	2.2	0.06	3	170	191	0.05	2.8	3.61	<5	2
91RN25	6	58	2.4	16000	2.12	0.49	6.70	0.04	2.93	<1	0.85	6.2	6.7	0.15	41	150	159	0.06	2.9	3.44	<5	4

	NI ppm NA	NI ppm ICP	CU ppm ICP	ZN ppm NA	ZN ppm ICP	AS ppm NA	AS ppm ICP	SE ppm NA	BR ppm NA	RB ppm NA	SR ppm NA	SR ppm ICP	Y ppm ICP	ZR ppm ICP	MO ppm NA	MO ppm ICP	AG ppm NA	AG ppm ICP	CD ppm ICP	SN ppm ICP	SB ppm NA	SB ppm ICP
91KC01	<100	10	12	80	98	2	<3	<5	<1	90	<500	543.0	23.5	16.6	<5	<1	<5	<0.1	<1	<10	1.0	<5
91KC05	<100	<1	2	<50	18	15	17	<5	<1	210	<500	36.7	20.1	24.3	<5	1	<5	<0.1	<1	<10	1.9	<5
91KC06	<100	2	5	<50	28	15	14	<5	<1	110	<500	33.0	6.3	9.0	<5	<1	<5	1.0	5	<10	3.6	<5
91KC09	<100	6	5	50	42	2	5	<5	<1	120	<500	183.0	15.0	42.9	<5	<1	<5	<0.1	7	<10	0.6	<5
91KC15	<100	3	9	<50	38	35	38	<5	<1	180	<500	63.6	11.1	54.8	<5	<1	<5	<0.1	132	<10	12.0	14
91KC16	<100	2	587	170	295	450	489	<5	<1	430	<500	45.5	2.7	37.6	27	36	27	13.3	<1	395	240.0	201
91KC17	<100	3	68	<50	77	2100	2270	<5	1	260	<500	38.8	5.8	38.5	8	4	<40	1.6	<1	24	160.0	200
91KC18	<100	12	5	<50	29	57	62	<5	<1	30	<500	8.4	8.2	10.0	8	7	<5	<0.1	<1	<10	64.0	63
91KC19	<100	13	7180	550	691	13	12	62	<1	<30	<500	309.0	8.3	20.5	12	12	120	79.4	3	<10	77.0	82
91KC21	<100	8	51	120	183	<2	11	<5	<1	200	<500	196.0	30.4	4.0	<5	<1	<5	0.3	<1	<10	1.2	8
91KC23	<100	4	17	<50	49	<2	<3	<5	<1	130	<500	239.0	18.1	10.5	<5	<1	<5	<0.1	<1	<10	0.4	<5
91KC24	<100	9	17	<50	14	<2	<3	<5	<1	<30	<500	1.5	0.9	1.0	<5	3	<5	0.3	<1	<10	0.6	8
91KC26	<100	5	32	50	39	3	8	<5	1	180	<500	500.0	16.1	59.7	63	106	<5	<0.1	<1	<10	0.4	<5
91RN02	<100	4	4	<50	21	<2	5	<5	<1	<30	<500	6.6	0.9	2.6	<5	<1	<5	<0.1	<1	<10	0.4	<5
91RN03	<100	5	7	<50	14	5	5	<5	1	<30	<500	21.7	1.1	2.1	<5	<1	<5	<0.1	<1	<10	0.6	<5
91RN04	<100	53	145	100	131	12	11	<5	<1	30	<500	164.0	44.7	27.1	<5	<1	<5	0.1	31	<10	1.2	9
91RN05	<100	5	47	<50	62	7	4	<5	<1	70	<500	402.0	19.2	22.9	<5	3	<5	<0.1	<1	<10	0.5	14
91RN07	<100	3	47	<50	30	14	14	<5	1	80	<500	332.0	21.6	40.8	<5	<1	<5	<0.1	<1	<10	1.0	6
91RN09	<100	25	174	150	145	17	<3	<5	<1	<30	500	401.0	25.1	35.9	<5	<1	<5	0.1	<1	<10	1.4	8
91RN11	<100	2	17	70	119	5	7	<5	<1	<30	<500	610.0	27.5	23.2	<5	<1	<5	<0.1	<1	<10	0.8	<5
91RN12	100	57	106	110	110	7	8	<5	<1	40	<500	671.0	23.6	61.0	<5	1	<5	<0.1	<1	<10	0.8	<5
91RN13	100	78	75	130	143	5	8	<5	1	100	<500	157.0	12.6	21.2	<5	<1	<5	<0.1	<1	<10	1.0	<5
91RN15	<100	4	21	<50	54	110	60	<5	<1	110	500	427.0	22.9	35.9	<5	<1	<5	<0.1	<1	<10	1.0	<5
91RN18	<100	2	755	60	79	280	247	<5	<1	200	<500	57.6	9.2	50.2	5	6	<20	6.0	<1	50	11.0	10
91RN19	<100	5	37	<50	27	90	77	<5	<1	210	<500	64.9	7.3	52.7	<5	3	<5	0.4	<1	<10	4.3	<5
91RN20	<100	16	68	80	91	92	93	<5	<1	100	<500	104.0	14.2	37.8	5	<1	<5	<0.1	<1	<10	2.1	<5
91RN21	100	24	11200	3400	3800	33	28	16	<1	30	<500	313.0	15.7	14.7	7	6	130	90.4	8	<10	50.0	43
91RN22	<100	18	88	41000	49700	13	10	32	<1	<30	<500	828.0	14.7	7.4	<5	<1	15	9.5	206	<10	19.0	25
91RN24	<100	2	29	370	416	6	10	<5	<1	370	<500	20.0	111.0	80.5	<5	7	<5	0.1	1	<10	1.6	<5
91RN25	<100	2	44	410	476	640	582	<5	<1	150	<500	169.0	14.7	8.4	<5	<1	<20	2.1	6	<10	59.0	66

	CS ppm NA	BA ppm NA	BA ppm ICP	LA ppm NA	CE ppm NA	ND ppm NA	SM ppm NA	EU ppm NA	TB ppm NA	YB ppm NA	LU ppm NA	HF ppm NA	TA ppm NA	W ppm NA	W ppm ICP	IR ppb NA	PB ppm ICP	BI ppm ICP	TH ppm NA	U ppm NA
91KC01	6	1300	1230	39	73	30	5.5	1.5	<0.5	1.8	0.31	4	1	<4	<10	<20	8	<3	13.0	4.8
91KC05	5	<100	36	6	15	10	2.3	0.4	1.6	6.6	0.96	4	2	<4	<10	<20	59	<3	18.0	6.7
91KC06	5	100	76	2	7	<10	0.9	0.2	0.7	2.2	0.31	1	<1	<4	<10	<20	22	<3	12.0	6.9
91KC09	7	600	663	22	38	20	3.7	0.4	0.7	2.8	0.42	3	2	<4	<10	<20	26	<3	20.0	5.7
91KC15	7	300	325	26	42	10	2.2	0.3	<0.5	1.7	0.26	4	1	6	<10	<20	40	<3	36.0	5.1
91KC16	28	900	993	9	11	<10	0.6	<0.2	<0.5	0.7	0.12	3	2	40	44	<20	24	97	23.0	9.0
91KC17	14	500	371	32	48	20	2.1	<0.3	<0.5	1.2	0.15	3	1	16	29	<20	6	<3	27.0	7.9
91KC18	4	200	144	17	34	10	2.4	0.5	<0.5	1.1	0.18	4	<1	6	<10	<20	<2	<3	6.0	4.3
91KC19	<3	<100	33	23	37	10	2.0	0.3	<0.5	0.8	0.14	3	1	<4	<10	<20	5470	159	7.0	13.7
91KC21	<3	1700	1840	55	99	40	7.5	1.4	1.2	2.9	0.38	5	2	<4	<10	<20	119	<3	18.0	2.7
91KC23	8	900	1000	33	57	20	4.4	0.9	0.5	2.2	0.33	3	1	6	<10	<20	22	<3	11.0	3.5
91KC24	<3	<100	14	1	<3	<10	<0.5	<0.2	<0.5	<0.2	<0.05	<1	<1	12	19	<20	7	30	<0.5	0.5
91KC26	8	1300	1460	75	117	40	6.3	1.4	<0.5	1.1	0.20	5	<1	5	<10	<20	23	<3	28.0	8.0
91RN02	<3	<100	45	1	<3	<10	<0.5	0.2	<0.5	0.3	<0.05	<1	<1	<4	<10	<20	6	<3	0.8	<0.5
91RN03	<3	100	140	2	5	<10	<0.5	<0.2	<0.5	<0.2	<0.05	<1	<1	<4	<10	<20	6	<3	1.0	<0.5
91RN04	<3	200	213	12	33	20	4.2	1.5	1.2	4.9	0.77	3	1	5	<10	<20	17	12	1.8	1.4
91RN05	5	1000	953	31	58	20	3.7	1.5	0.5	1.6	0.27	5	1	<4	<10	<20	<2	<3	11.0	5.2
91RN07	<3	1800	1720	20	41	20	3.6	0.9	0.5	1.9	0.29	4	<1	4	<10	<20	7	3	14.0	4.9
91RN09	<3	200	190	20	35	20	4.3	0.7	0.7	2.5	0.38	2	1	<4	<10	<20	<2	7	6.1	1.2
91RN11	3	1100	1310	28	52	20	4.4	1.5	0.5	2.3	0.34	4	<1	<4	<10	<20	6	6	8.3	2.7
91RN12	5	700	573	58	103	40	7.5	2.1	0.6	2.1	0.30	3	1	<4	<10	<20	<2	10	11.0	3.3
91RN13	9	800	752	42	77	30	6.4	2.0	1.0	2.9	0.42	5	1	<4	<10	<20	11	11	9.3	2.4
91RN15	10	1300	1340	43	74	30	4.8	1.5	0.5	2.0	0.29	5	<1	<4	<10	<20	7	10	19.0	6.0
91RN18	9	500	551	26	43	10	2.0	0.5	<0.5	1.5	0.26	3	2	10	<10	<20	71	67	30.0	7.1
91RN19	12	600	594	17	48	10	1.4	0.3	<0.5	1.7	0.28	3	1	5	<10	<20	45	37	34.0	4.6
91RN20	9	700	629	26	48	20	3.6	0.8	0.5	2.0	0.30	4	<1	7	<10	<20	12	9	12.0	2.5
91RN21	<3	500	516	21	38	10	2.4	0.5	<0.5	1.1	0.18	3	<1	<4	<10	<20	17900	215	5.5	12.3
91RN22	<3	<100	24	25	48	20	2.8	0.7	<0.5	1.3	0.18	2	1	58	*INF	<20	21900	33	6.3	1.9
91RN24	10	100	35	63	150	70	14.3	0.2	3.2	12.8	1.91	10	8	7	<10	<20	173	6	48.0	17.2
91RN25	6	900	930	28	48	20	3.7	0.6	<0.5	1.8	0.28	3	<1	6	<10	<20	1520	<3	10.0	2.5

*INF - Composition makes detection impossible by this method

SAMPLE LOCATIONS

GEOCHEMICAL SAMPLES

	Long(W)	Lat(N)
91KC01	145.563	64.698
91KC05	145.533	64.890
91KC06	145.543	64.891
91KC09	144.911	64.834
91KC15	144.580	64.730
91KC16	144.582	64.732
91KC17	144.582	64.732
91KC18	144.582	64.732
91KC19	144.433	64.669
91KC21	144.206	64.656
91KC23	144.110	64.744
91KC24	144.110	64.744
91KC26	144.148	64.775
91RN02	145.567	64.700
91RN03	145.445	64.734
91RN04	145.442	64.730
91RN05	145.438	64.729
91RN07	145.435	64.727
91RN09	145.592	64.881
91RN11	145.586	64.881
91RN12	145.591	64.879
91RN13	144.908	64.831
91RN15	144.831	64.808
91RN18	144.566	64.725
91RN19	144.566	64.728
91RN20	144.566	64.728
91RN21	144.428	64.671
91RN22	144.433	64.669
91RN24	144.208	64.649
91RN25	144.157	64.745

MAJOR OXIDE SAMPLES

		Long(W)	Lat(N)
1	91RN01	145.569	64.697
2	91RN06	145.435	64.727
3	91RN08	145.438	64.725
4	91RN10	145.586	64.881
5	91RN14	144.920	64.817
6	91RN17	144.559	64.725
7	91RN23	144.206	64.653
8	91RN26	144.152	64.744
9	91RN27	144.559	64.725
10	91RN28	144.559	64.725
11	91KC02	145.454	64.741
12	91KC03	145.454	64.741
13	91KC08	145.586	64.881
14	91KC09	144.911	64.834
15	91KC10	144.904	64.833
16	91KC11	144.920	64.817
17	91KC12	144.831	64.808
18	91KC14	144.580	64.730
19	91KC15	145.454	64.741
20	91KC20	144.206	64.653
21	91KC22	144.152	64.744
22	91KC25a	144.559	64.725
23	91kc25b	145.454	64.741

ANALYTICAL METHODS AND DETECTION LIMITS

	Method	Detection Limit		Method	Detection Limit
AU	NA	5	SR	NA	500
LI	ICP	1	SR	ICP	0.5
BE	ICP	0.5	Y	ICP	0.1
NA	NA	500	ZR	ICP	0.5
NA	ICP	0.01	MO	NA	5
MG	ICP	0.01	MO	ICP	1
AL	ICP	0.01	AG	NA	5
P	ICP	0.01	AG	ICP	0.1
K	ICP	0.01	CD	ICP	1
CA	NA	1	SN	ICP	10
CA	ICP	0.01	SB	NA	0.2
SC	NA	0.1	SB	ICP	5
SC	ICP	0.5	CS	NA	3
TI	ICP	0.01	BA	NA	100
V	ICP	2	BA	ICP	1
CR	NA	10	LA	NA	1
CR	ICP	1	CE	NA	3
MN	ICP	0.01	ND	NA	10
FE	NA	0.1	SM	NA	0.5
FE	ICP	0.01	EU	NA	0.2
CO	NA	5	TB	NA	0.5
CO	ICP	1	YB	NA	0.2
NI	NA	100	LU	NA	0.05
NI	ICP	1	HF	NA	1
CU	ICP	0.5	TA	NA	1
ZN	NA	50	W	NA	4
ZN	ICP	0.5	W	ICP	10
AS	NA	2	IR	NA	20
AS	ICP	3	PB	ICP	2
SE	NA	5	BI	ICP	3
BR	NA	1	TH	NA	0.5
RB	NA	30	U	NA	0.5

Analyses by X-Ray Assay Laboratories, 1885 Leslie Street, Don Mills, Ontario M3B 3J4 CANADA

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