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Division of Geological & Geophysical Surveys

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LAND SELECTION UNITS 30 AND 31 (BETTLES, BEAVER, WISEMAN, AND CHANDALAR QUADRANGLES): REFERENCES, GEOCHEMICAL AND MAJOR OXIDE DATA

by

K.H. Clautice, L.E. Burns, and S.A. Liss

April 1993

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

CONTENTS

INTRODUCTION

This report covers Land Selection Units 30 and 31 in the Beaver, Bettles, Chandalar and Wiseman Quadrangles. 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. Although much of the evaluation was based on a review of the literature, 2 days of helicopter-supported field work was conducted by the authors in July of 1991.

Included herein is a 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.

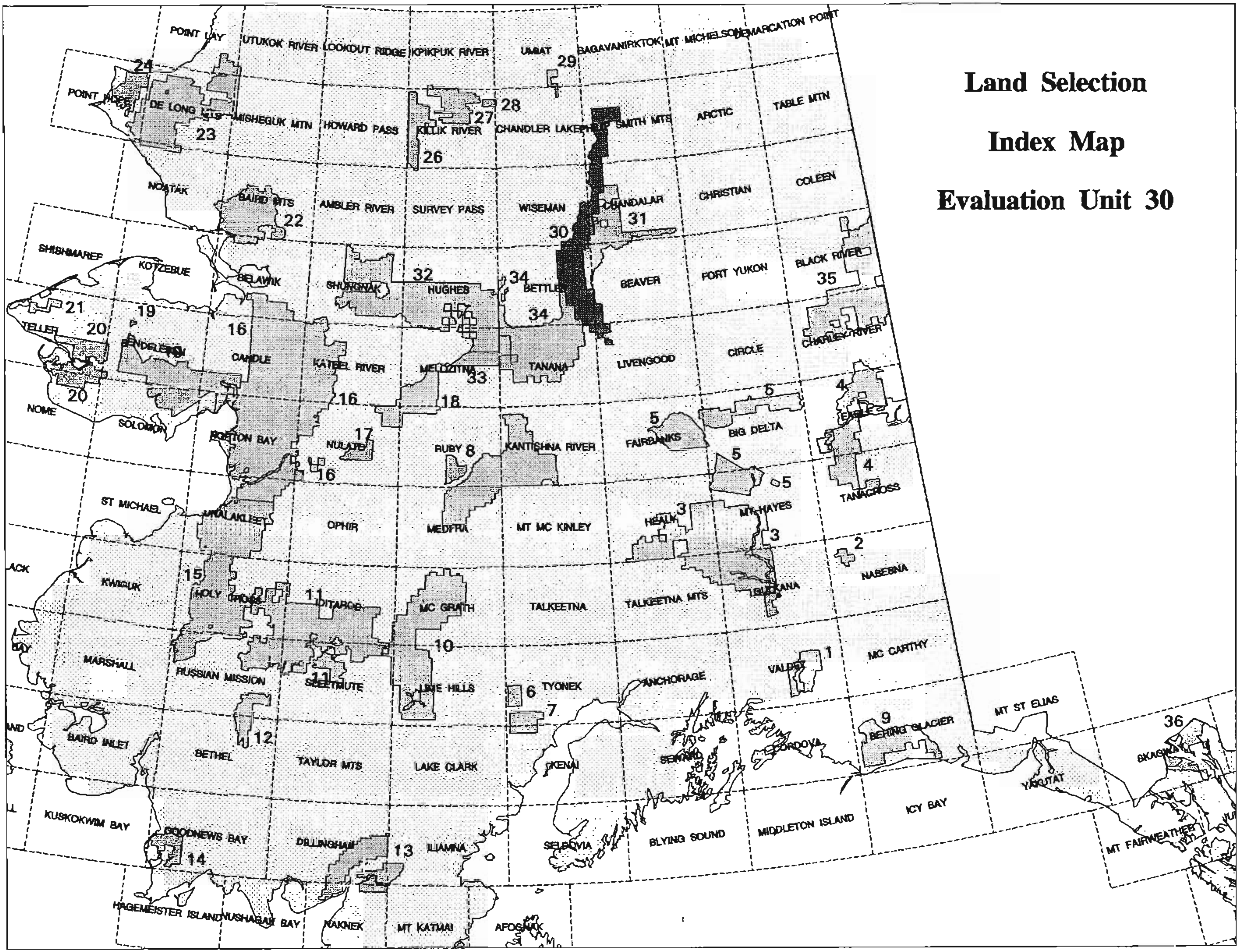
The discriminant score is a number between 0 and 100; a score of 100 indicates that the composition of the sample is indistinguishable from those of gold-associated plutons; a score of 0 indicates the opposite. The score is not directly proportional to the amount of gold present and does not indicate that there is gold at the sample site, but it is a good estimate of whether the sample belongs to a plutonic system 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.

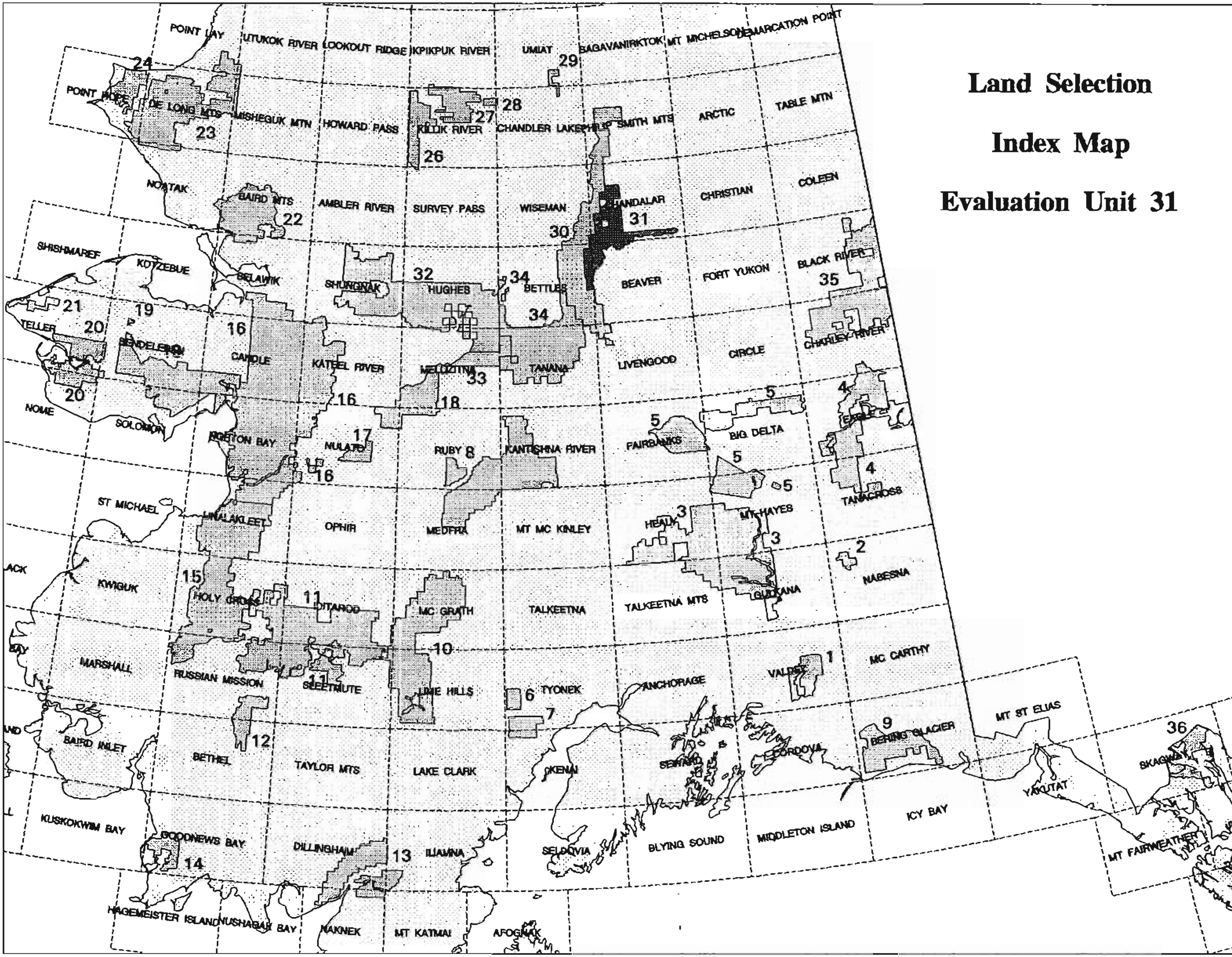
Land Selection

Index Map

Evaluation Unit 30



Land Selection Index Map Evaluation Unit 31



	Sample	Long (W)	Lat (N)	Pluton	MAJOR OXIDE ANALYSES (WT%)											ADDITIONAL ELEMENTS								
					SIO2	TIO2	AL2O3	FE2O3	FEO	MNO	MGO	CAO	NA2O	K2O	P2O5	CR PPM	RB PPM	SR PPM	Y PPM	ZR PPM	NB PPM	BA PPM	LOI	SUM*
1	91LB1	149.266	67.644	Horace Mt	65.2	0.658	16.7	2.092	2.5	0.09	1.12	1.25	4.51	4.30	0.17	<10	178	93	71	417	23	765	1.31	100.363
2	91LB2	149.388	67.631	Big Spruce	62.2	0.594	15.8	1.644	2.3	0.11	2.24	3.73	3.59	3.53	0.16	22	138	399	20	165	29	1160	3.54	99.918
3	91LB8	149.442	67.016	Hodzana	65.2	0.534	16.6	1.125	2.2	0.07	1.37	2.60	3.51	5.09	0.24	<10	176	839	37	282	<10	2050	0.70	99.874
4	91LB8B	149.442	67.016	Hodzana	53.1	1.230	17.7	3.371	4.3	0.14	3.24	6.10	3.14	4.20	0.72	<10	153	1390	26	256	24	2400	0.85	99.060
5	91LB9	149.806	66.953	Hodzana	68.8	0.409	15.2	1.377	1.1	0.07	0.90	1.96	3.44	5.20	0.2	<10	210	634	18	222	20	1300	0.47	99.527
6	91LB13	150.098	67.002	Jim River	58.9	0.415	19.3	2.375	1.3	0.08	1.13	2.95	2.84	8.80	0.24	<10	173	2380	<10	89	11	4020	0.77	100.008
7	91LB15	150.098	67.002	Jim River	72.6	0.345	13.8	1.069	1.0	0.06	1.07	2.26	3.53	3.84	0.17	21	252	435	<10	176	18	357	0.70	100.703
8	91LB16	149.916	66.946	Hodzana	53.3	0.976	18.1	2.236	4.8	0.11	3.68	5.50	2.84	4.24	0.61	38	165	1500	39	279	19	2140	0.85	98.261
9	91LB18	149.690	66.773	Hodzana	71.0	0.309	15.2	0.312	1.6	0.07	0.70	2.14	4.14	3.28	0.09	<10	165	558	18	131	17	1950	0.54	99.883
10	91LB21	150.098	67.002	Pump 5	60.6	0.482	19.0	2.109	1.0	0.10	1.32	2.84	5.01	6.24	0.25	<10	237	1430	23	433	20	2330	0.85	100.431
11	91LB24	150.709	66.463	Kanuti-rhy.	80.2	0.099	10.4	0.249	<0.1	0.03	0.19	0.10	1.26	5.61	0.02	<10	330	103	26	93	26	253	1.39	99.755
12	91LB31.5	150.581	66.376	Coal Ck	76.9	0.094	12.8	0.449	<0.1	0.02	0.14	0.68	3.45	4.97	0.02	<10	334	51	13	49	<10	139	0.77	100.470
13	91LB33	150.241	66.458	Kanuti	65.0	0.710	16.0	1.567	2.9	0.10	1.39	3.27	4.01	3.62	0.26	<10	163	597	56	255	24	1326	0.70	100.131
14	91LB39	149.847	66.020	Sithylem.	75.6	0.098	12.9	0.445	0.4	0.03	0.15	0.61	3.17	5.55	0.02	<10	543	24	54	74	26	124	0.62	99.735
15	91KC207	149.084	67.610	Phoebe Ck	76.8	0.115	12.7	0.534	0.5	0.03	0.23	0.58	3.74	4.57	0.03	<10	313	<10	65	125	26	105	0.47	100.430
16	91KC221	149.245	67.081	Hodzana	71.3	0.269	15.5	0.485	1.3	0.05	0.70	1.84	3.95	4.11	0.13	12	150	850	25	168	14	1960	0.54	100.684
17	91KC223	149.397	67.145	Siwash Ck	72.4	0.150	15.0	0.287	0.3	0.02	0.38	1.34	4.10	4.58	0.05	<10	211	555	<10	136	12	913	1.31	100.161
18	91KC226A	148.759	67.007	Hodzana	72.1	0.208	15.0	1.025	0.4	0.05	0.48	1.38	4.29	4.75	0.08	12	217	558	31	162	29	1130	0.39	100.448
19	91KC226B	148.759	67.007	Hodzana	68.2	0.358	16.4	1.509	1.0	0.07	0.76	1.93	4.36	4.70	0.18	<10	162	1010	<10	271	41	2030	0.39	100.374
20	91KC229	150.098	67.002	Jim River	58.9	0.625	17.8	2.684	2.3	0.13	2.27	4.25	3.59	6.12	0.33	18	199	1000	31	392	25	1730	0.39	100.041
21	91KC232	150.098	67.002	Jim River	76.2	0.133	13.0	0.639	0.1	0.03	0.32	1.11	3.46	4.55	0.04	13	245	314	<10	88	13	433	0.62	100.341
22	91KC234	149.750	66.841	Hodzana	60.9	0.743	17.6	2.248	2.8	0.11	2.19	4.20	4.10	4.04	0.34	13	132	1010	42	333	28	1800	0.31	100.284
23	91KC235	150.084	66.725	Bonanza	64.2	0.628	16.8	1.782	2.5	0.08	1.71	3.24	3.20	4.91	0.3	14	171	972	56	352	17	1990	0.54	100.583
24	91KC245	150.581	66.376	Coal Ck	78.7	0.092	11.1	0.387	0.3	0.03	0.10	0.46	3.31	4.12	0.02	11	410	<10	<10	52	<10	66	0.39	99.103
25	91KC247	150.581	66.376	Coal Ck	71.9	0.436	13.6	0.590	1.8	0.06	0.68	1.63	3.16	4.84	0.14	<10	305	166	38	189	23	607	0.62	99.810
26	91KC252	150.581	66.376	Hot Spring	71.4	0.490	13.6	0.926	2.1	0.08	0.85	1.57	3.26	4.77	0.14	<10	285	181	30	328	<10	621	0.62	100.210
27	91KC253	150.581	66.376	Hot Spring	66.2	0.588	15.5	0.835	2.2	0.07	1.25	2.52	3.27	5.40	0.21	10	236	458	32	304	19	1170	1.39	99.938
28	91KC254	150.581	66.376	Hot Spring	60.7	0.719	15.1	1.340	3.6	0.12	2.24	4.14	2.80	6.91	0.41	<10	217	769	39	287	14	1930	1.16	100.015
29	91KC255	149.847	66.020	Sithylem.	76.3	0.140	12.4	0.552	0.7	0.04	0.19	0.90	3.19	4.91	0.04	<10	450	65	55	157	26	188	0.47	100.020
30	91KC257	149.847	66.020	Sithylem.	75.8	0.079	13.3	0.303	0.6	0.04	0.13	0.24	3.61	4.73	0.03	<10	613	<10	60	110	35	133	0.47	99.508
31	91SL55A	149.070	67.612	Phoebe Ck	75.2	0.238	13.0	0.870	0.9	0.06	0.47	0.95	4.13	3.24	0.07	15	220	106	63	162	37	292	0.93	100.265

MAJOR OXIDE ANALYSES (WT%) | ADDITIONAL ELEMENTS

	Sample	Long (W)	Lat (N)	Pluton	SIO2	TIO2	AL2O3	FE2O3	FEO	MNO	MGO	CAO	NA2O	K2O	P2O5	CR PPM	RB PPM	SR PPM	Y PPM	ZR PPM	NB PPM	BA PPM	LOI	SUM*
32	91SL55b	149.069	67.612	Phoebe Ck	74.7	0.211	13.0	0.901	0.8	0.07	0.37	0.99	3.66	4.60	0.07	11	298	40	73	154	34	255	0.47	100.033
33	91SL56A	149.007	67.526	Baby Ck	76.2	0.156	12.7	0.979	0.1	0.02	0.27	0.07	0.11	5.15	0.05	13	233	23	33	102	18	400	2.70	98.611
34	91SL58	149.084	67.673	Horace Mt	68.1	0.402	15.3	1.284	1.4	0.07	1.38	2.73	3.76	4.48	0.21	17	240	649	30	199	25	943	0.62	100.137
35	91SL60	149.899	66.939	Hodzana	70.2	0.308	15.0	1.167	1.1	0.05	0.79	2.06	3.42	4.74	0.18	<10	184	655	11	150	<10	1650	0.39	99.855
36	91SL61B	149.606	67.043	Hodzana	65.4	0.550	16.1	1.394	2.3	0.08	1.82	3.22	3.31	4.84	0.29	21	204	840	32	287	18	1380	0.47	100.354
37	91SL63	149.069	67.084	Hodzana	60.3	0.892	17.2	1.820	3.5	0.09	2.29	4.29	3.88	3.52	0.48	12	146	1090	20	319	38	1480	0.47	99.485
38	91SL64B	149.010	67.047	Hodzana	72.1	0.214	14.9	0.643	0.6	0.04	0.38	1.30	3.88	4.83	0.07	<10	152	610	20	114	<10	1930	0.54	99.686
39	91SL65	148.846	67.008	Hodzana	65.2	0.524	16.5	2.066	2.1	0.08	1.50	3.45	4.38	3.22	0.22	<10	120	669	38	259	26	1140	0.47	100.207
40	91SL66	150.096	67.002	Jim River	58.3	0.419	20.1	1.883	1.5	0.04	0.98	3.11	3.03	8.45	0.2	<10	138	2620	20	78	12	5220	0.62	99.722
41	91SL67B	150.098	67.002	Jim River	70.7	0.243	15.2	1.123	0.6	0.10	0.35	0.80	4.72	5.44	0.06	<10	411	108	42	434	34	245	0.62	100.177
42	91SL72	149.803	66.773	Hodzana	71.7	0.234	15.0	0.426	1.2	0.06	0.55	1.66	3.74	4.28	0.09	<10	174	596	26	175	12	1600	0.54	99.911
43	91SL74	150.098	67.002	Bonanza	64.9	0.526	16.0	1.597	2.0	0.08	1.52	2.68	3.50	5.02	0.22	11	192	758	26	240	27	1750	0.47	99.083
44	91SL75	150.098	67.002	Bonanza	74.6	0.076	14.1	0.279	<0.1	0.02	0.19	0.45	4.61	4.98	0.08	<10	302	77	46	41	26	237	0.31	99.890
45	91SL76	150.098	67.002	Pump 5	63.2	0.419	18.0	2.204	0.5	0.13	0.54	1.01	5.47	7.37	0.1	<10	284	563	43	488	23	676	0.77	100.017
46	91SL77	150.241	66.458	Kanuti, W	67.0	0.476	15.7	1.461	1.7	0.07	1.34	2.52	3.42	5.03	0.23	15	222	857	39	246	11	1470	0.70	100.168
47	91SL77.5	150.241	66.458	Kanuti, W	58.2	1.170	16.3	2.340	4.4	0.13	3.03	4.16	3.56	3.48	0.51	18	237	769	33	508	42	599	0.93	98.965
48	91SL78	150.098	67.002	Kanuti	75.4	0.064	13.4	0.369	0.1	0.04	0.18	0.73	4.53	4.20	0.06	<10	271	119	48	63	12	483	0.93	100.128
49	91SL81	149.776	66.037	Fort Hamli	48.6	1.040	15.2	2.420	6.2	0.14	7.38	*****	2.32	0.59	0.11	146	22	308	29	76	20	469	3.16	100.279
50	91SL83	149.847	66.020	Fort Hamll	72.9	0.414	12.9	0.778	1.9	0.07	0.52	1.59	3.21	4.49	0.11	<10	277	116	79	316	27	576	0.77	100.029
51	91SL84	149.776	66.037	Fort Hamli	74.6	0.156	13.0	0.452	0.7	0.03	0.26	0.45	2.57	6.92	0.04	<10	345	96	15	132	<10	274	0.47	99.825
52	91SL85	150.581	66.376	Coal Ck	75.9	0.096	13.0	0.337	0.3	0.03	0.12	0.51	3.23	5.82	0.02	<10	404	35	<10	91	<10	141	0.62	100.092
53	91SL87	150.241	66.458	Kanuti	70.4	0.372	15.1	0.678	1.9	0.07	0.71	1.82	3.75	4.54	0.15	<10	222	311	31	197	22	1100	0.62	100.540
54	91SL94A	149.847	66.020	Sithylem.	75.2	0.204	12.6	0.519	1.0	0.04	0.31	1.08	2.90	5.05	0.06	<10	423	95	51	202	<10	278	0.77	99.966

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

NORMATIVE MINERALS

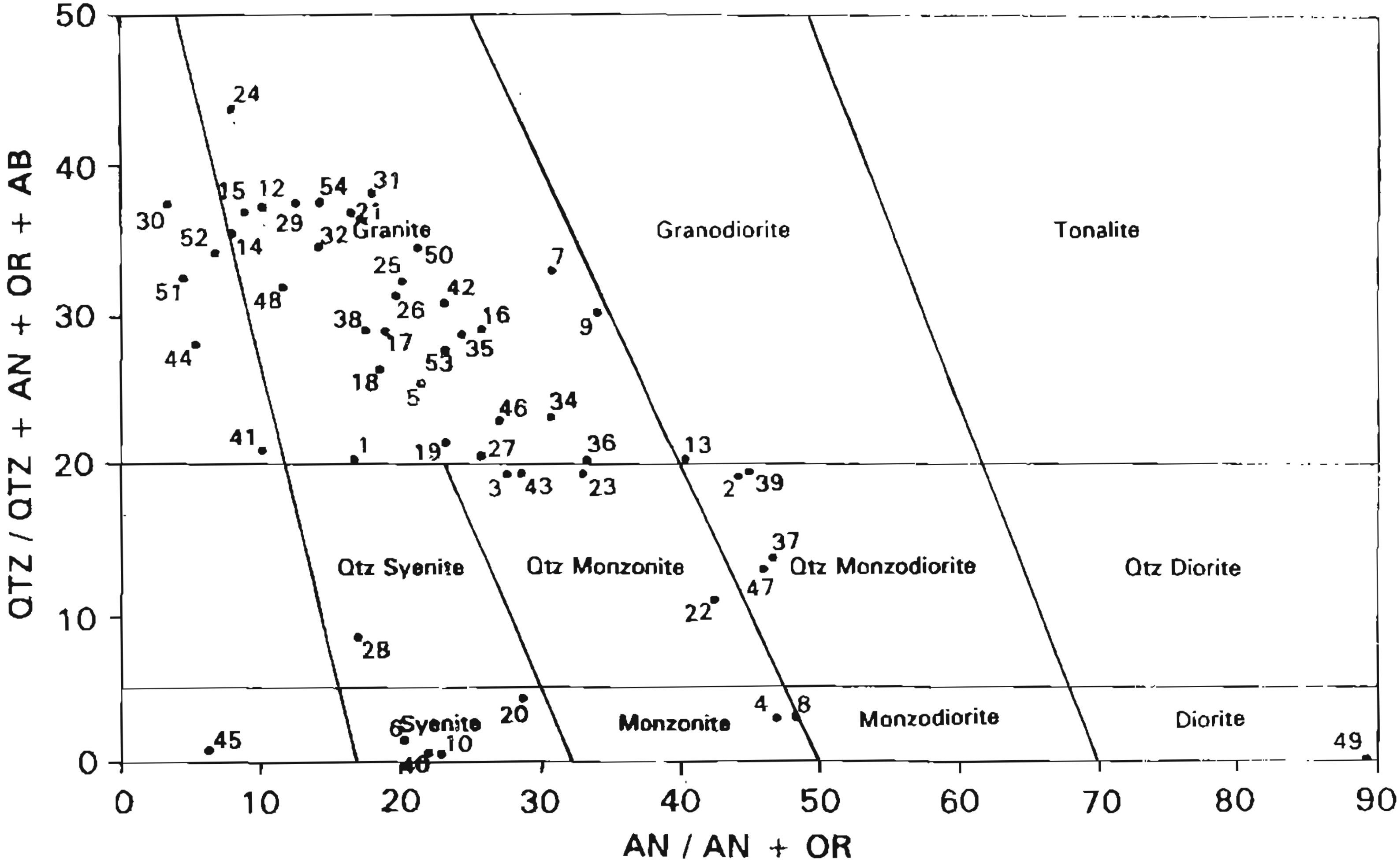
	Sample	QTZ	COR	OR	AB	AN	DIOP	HYP	OL	MT	HEM	ILM	RU	AP	GOLD DISCRIMINANT*
1	91LB1	18.015	2.800	25.773	38.705	5.164		4.800		3.077		1.268		0.399	75.96
2	91LB2	17.496		20.681	31.734	17.868	0.299	7.867		2.490		1.179		0.387	8.79
3	91LB8	17.554	1.181	30.523	30.139	11.500		5.856		1.655		1.029		0.564	85.09
4	91LB8B	2.250		25.523	27.322	22.415	3.119	10.231		5.026		2.402		1.715	4.59
5	91LB9	24.087	0.839	31.146	29.502	8.532		2.613		2.025		0.787		0.469	0.00
6	91LB13	1.402	0.319	52.884	24.438	13.290		2.862		3.303	0.137	0.802		0.565	0.00
7	91LB15	31.271	0.135	22.749	29.944	10.128		3.168		1.554		0.657		0.395	0.00
8	91LB16	2.568	0.309	25.993	24.929	24.175		15.275		3.363		1.923		1.465	100.00
9	91LB18	28.275	1.177	19.609	35.440	10.146		4.091		0.458		0.594		0.211	80.33
10	91LB21	0.571		37.264	42.840	11.042	1.204	2.764		2.175	0.631	0.925		0.585	0.00
11	91LB24	51.866	2.159	33.738	10.850	0.372		0.482		0.136	0.160	0.191		0.047	0.00
12	91LB31.5	36.343	0.559	29.480	29.301	3.255		0.350		0.116	0.371	0.179		0.046	0.00
13	91LB33	18.308	0.164	21.845	34.332	14.697		6.583		2.299		1.364		0.609	85.98
14	91LB39	34.688	0.623	33.136	27.100	2.926		0.641		0.652		0.188		0.047	0.00
15	91KC207	35.964	0.619	27.051	31.699	2.686		0.917		0.776		0.219		0.070	0.00
16	91KC221	27.335	1.525	24.376	33.544	8.310		3.391		0.706		0.513		0.302	84.02
17	91KC223	28.075	0.995	27.446	35.181	6.410		1.064		0.422		0.289		0.117	0.00
18	91KC226A	25.586	0.485	28.135	36.384	6.339		1.198		0.851	0.440	0.396		0.186	0.00
19	91KC226B	20.144	1.068	27.922	37.088	8.444		2.032		2.200		0.684		0.419	0.00
20	91KC229	3.505		36.530	30.683	14.525	3.651	5.207		3.931		1.199		0.772	0.05
21	91KC232	36.109	0.363	27.027	29.428	5.273		0.801		0.035	0.618	0.258		0.093	0.00
22	91KC234	9.529		24.048	34.945	17.818	0.753	7.410		3.283		1.422		0.793	18.89
23	91KC235	17.251	1.055	29.204	27.253	14.207		6.531		2.601		1.201		0.699	24.40
24	91KC245	43.139	0.413	24.687	28.398	2.182		0.389		0.569		0.177		0.047	0.00
25	91KC247	30.234	0.541	28.937	27.052	7.257		3.949		0.866		0.838		0.328	63.94
26	91KC252	29.080	0.559	28.418	27.810	6.931		4.585		1.354		0.938		0.327	43.33
27	91KC253	19.077	0.200	32.546	28.220	11.353		5.734		1.235		1.139		0.496	92.67
28	91KC254	7.068		41.632	24.155	8.387	8.074	6.345		1.981		1.392		0.968	100.00
29	91KC255	36.787	0.299	29.200	27.164	4.231		1.153		0.806		0.268		0.093	0.00
30	91KC257	36.129	1.899	28.272	30.896	1.006		1.132		0.444		0.152		0.070	48.93
31	91SL55A	36.261	1.149	19.314	35.252	4.293		1.839		1.273		0.456		0.164	0.00

NORMATIVE MINERALS

	Sample	QTZ	COR	OR	AB	AN	DIOP	HYP	OL	MT	HEM	ILM	RU	AP	GOLD DISCRIMINANT*
32	91SL55b	33.313	0.370	27.354	31.163	4.482		1.437		1.315		0.403		0.163	0.00
33	91SL56A	57.869	7.241	31.765	0.971	0.022		0.702			1.022	0.265	0.023	0.121	0.00
34	91SL58	21.635		26.709	32.098	11.743	0.430	4.247		1.878		0.770		0.491	0.00
35	91SL60	27.061	0.938	28.288	29.225	9.134		2.633		1.709		0.591		0.421	0.00
36	91SL61B	17.905	0.257	28.801	28.203	14.180		6.893		2.035		1.052		0.676	38.51
37	91SL63	11.565	0.362	21.168	33.410	18.470		9.486		2.686		1.724		1.131	98.49
38	91SL64B	28.056	1.105	28.842	33.175	6.055		1.251		0.942		0.411		0.164	0.00
39	91SL65	17.879	0.064	19.173	37.344	15.799		5.208		3.019		1.003		0.513	0.09
40	91SL66	0.527	0.810	50.945	26.157	14.409		3.083		2.786		0.812		0.473	0.83
41	91SL67B	20.500	0.238	32.361	40.203	3.601		0.877		1.566	0.050	0.465		0.140	0.00
42	91SL72	29.036	1.427	25.562	31.984	7.729		2.978		0.624		0.449		0.211	85.63
43	91SL74	17.545	0.472	30.256	30.205	12.096		5.527		2.362		1.019		0.520	0.68
44	91SL75	20.770		2.928	16.487	22.104	23.145	12.355		0.340		1.659		0.214	0.00
45	91SL76	0.842		44.016	46.777	2.825	1.229	0.789		0.830	1.655	0.804		0.234	0.00
46	91SL77	20.758	0.604	30.039	29.245	11.117		4.645		2.141		0.914		0.538	0.02
47	91SL77.5	10.441	0.343	21.139	30.964	17.792		12.338		3.488		2.284		1.214	99.97
48	91SL78	31.611	0.220	25.051	38.687	3.260		0.452		0.270	0.186	0.123		0.140	0.00
49	91SL81			3.620	20.384	30.444	25.944	10.639	3.011	3.644		2.051		0.264	100.00
50	91SL83	32.496	0.133	26.832	27.467	7.251		3.628		1.141		0.795		0.258	52.74
51	91SL84	31.871	0.564	41.230	21.925	1.988		1.369		0.661		0.299		0.093	0.03
52	91SL85	33.765	0.511	34.612	27.505	2.415		0.472		0.492		0.163		0.047	0.00
53	91SL87	25.699	1.072	26.965	31.892	8.091		4.234		0.988		0.710		0.349	80.43
54	91SL94A	36.256	0.549	30.154	24.794	5.018		1.937		0.760		0.392		0.140	10.64

**Gold discriminant described within text of this report.

Normative Mineral Ratios
(after Streckeisen and LeMaitre, 1979)



GEOCHEMICAL ANALYSES

Sample	Long. (W)	Lat. (N)	Au INAA PPB	Ir INAA PPB	Ag INAA PPM	Zn INAA PPM	Mo INAA PPM	Ni INAA PPM	Co INAA PPM	Cd INAA PPM	As INAA PPM	Sb INAA PPM	Fe INAA PCT	Se INAA PPM	Te INAA PPM	Ba INAA PPM	Cr INAA PPM	Sn INAA PPM	W INAA PPM	Cs INAA PPM	La INAA PPM	Ce INAA PPM	Sm INAA PPM	Eu INAA PPM	Tb INAA PPM
91KC201	149.266	67.644	<5	<100	<5	<200	<2	<20	<10	<10	<1	<0.2	<0.5	<10	<20	<100	<50	<200	<2	<1	<5	<10	<0.2	<2	<1
91KC202	149.251	67.660	7	<100	<5	<200	2	38	13	<10	12	0.8	3.2	<10	<20	340	110	<200	<2	2	16	60	4.3	<2	<1
91KC204	149.262	67.616	<5	<100	<5	300	<2	33	19	<10	45	5.9	5.3	<10	<20	1800	210	<200	<2	2	34	90	6.6	<2	<1
91KC205	149.069	67.612	<5	<100	<5	<200	<2	<20	<10	<10	9	1.9	0.8	<10	<20	<100	<50	<200	2	6	25	68	0.9	<2	<1
91KC208	149.007	67.528	<5	<100	<5	460	27	29	<10	<10	37	5.9	2.8	<10	<20	5300	110	<200	<2	1	12	36	2.9	<2	<1
91KC211	149.000	67.508	<5	<100	<5	<200	34	<20	<10	<10	221	2.2	2.9	<10	<20	4100	140	<200	<2	3	17	48	3.6	<2	<1
91KC212	149.000	67.508	<5	<100	<5	<200	<2	<20	<10	<10	2	0.3	<0.5	<10	<20	<100	<50	<200	<2	<1	<5	<10	<0.2	<2	<1
91KC213	149.084	67.673	<5	<100	<5	<200	6	<20	<10	<10	2	0.2	1	<10	<20	300	<50	<200	<2	<1	12	29	1.6	<2	<1
91KC214	149.084	67.673	<5	<100	<5	<200	<2	<20	<10	<10	6	0.3	<0.5	<10	<20	350	<50	<200	<2	2	25	63	2.2	<2	<1
91KC215	150.182	67.365	<5	<100	<5	<200	<2	<20	49	<10	11	1	4.4	<10	<20	490	61	<200	<2	4	52	130	10	<2	1
91KC216	150.182	67.365	<5	<100	<5	<200	3	<20	<10	<10	9	1.5	3.2	<10	<20	890	<50	<200	<2	5	13	44	3.2	<2	<1
91KC224	149.397	67.145	<5	<100	<5	<200	<2	1600	150	<10	32	1.6	7.2	<10	<20	<100	3400	<200	<2	5	<5	<10	<0.2	<2	<1
91KC238	150.996	66.518	<5	<100	<5	<200	<2	<20	<10	<10	<1	<0.2	1	<10	<20	<100	<50	<200	<2	<1	<5	<10	0.5	<2	<1
91kc239	150.987	66.519	<5	<100	<5	<200	<2	48	13	<10	11	2	5.2	<10	<20	330	80	<200	<2	2	15	38	3	<2	<1
91KC242	149.804	66.003	<5	<100	<5	<200	<2	130	65	<10	3	6.3	8.9	<10	<20	490	400	<200	<2	2	12	27	3.5	<2	<1
91KC246	149.993	66.283	<5	<100	<5	<200	<2	<20	<10	<10	8	0.5	0.6	<10	<20	150	<50	<200	<2	18	10	29	2	<2	<1
91KC249	150.241	66.458	<5	<100	<5	<200	<2	<20	<10	<10	<1	2.6	<0.5	<10	<20	960	<50	<200	<2	19	<5	<10	1.4	<2	<1
91LB4b	149.000	67.508	<5	<100	<5	<200	9	41	18	<10	4	2.7	6.2	<10	<20	2800	160	<200	<2	5	13	31	2.4	<2	<1
91LB27	150.204	66.491	9	<100	<5	310	<2	<20	<10	<10	15	0.7	1.5	<10	<20	1400	<50	<200	3	3	31	55	1.8	<2	<1
91SL52	149.251	67.660	<5	<100	<5	<200	<2	<20	12	<10	14	0.7	1.7	<10	<20	<100	63	<200	<2	<1	10	47	2.8	<2	<1
91SL54	149.262	67.616	<5	<100	<5	<200	<2	<20	<10	<10	1	0.5	<0.5	<10	<20	<100	<50	<200	<2	<1	<5	<10	<0.2	<2	<1
91SL56a	149.007	67.526	<5	<100	<5	<200	<2	<20	<10	<10	2	0.4	<0.5	<10	<20	<100	<50	<200	<2	2	6	25	1.8	<2	<1
91SL62a	149.397	67.145	<5	<100	<5	<200	<2	<20	<10	<10	<1	<0.2	<0.5	<10	<20	130	<50	<200	<2	2	<5	<10	<0.2	<2	<1
91SL62b	149.397	67.145	18	<100	<5	<200	<2	<20	<10	<10	17	0.7	0.7	<10	<20	750	<50	<200	2	6	<5	<10	0.6	<2	<1
91SL62c	149.397	67.145	<5	<100	<5	<200	<2	1300	80	<10	38	8	4.4	<10	<20	<100	2500	<200	<2	3	<5	<10	<0.2	<2	<1
91SL62d	149.397	67.145	8	<100	<5	<200	<2	41	<10	<10	<1	<0.2	0.9	<10	<20	1900	<50	<200	8	15	<5	<10	<0.2	<2	<1
91SL77	150.751	66.493	<5	<100	<5	200	<2	72	48	<10	2	<0.2	10	<10	<20	830	420	<200	<2	<1	32	100	7.9	<2	1
91SL78	150.279	66.523	<5	<100	<5	<200	<2	<20	<10	<10	<1	<0.2	0.7	<10	<20	140	<50	<200	<2	<1	<5	12	0.6	<2	<1
91SL80	150.204	66.491	5	<100	8	930	4	<20	<10	<10	13	2.3	2.5	<10	<20	1100	<50	<200	3	3	22	53	1.6	<2	<1
91SL94b	150.930	66.082	<5	<100	<5	<200	<2	<20	<10	<10	2	<0.2	<0.5	<10	<20	<100	<50	<200	<2	2	6	27	0.6	<2	<1

	Yb	Lu	Sc	Hf	Ta	Th	U	Na	Br	Rb	Zr	Ag	Cu	Zn	Mo	Ni	Co	Cd	As	Sb	Fe	Mn	Te	Ba	Cr	V
	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	ICP	ICP	ICP	ICP	ICP	ICP	ICP	ICP	ICP	ICP	ICP	ICP	ICP	ICP	ICP
Sample	PPM	PPM	PPM	PPM	PPM	PPM	PPM	PCT	PPM	PPM	PPM	PPM	PPM	PPM	PPM	PPM	PPM	PPM	PPM	PPM	PCT	PPM	PPM	PPM	PPM	PPM
91KC201	<5	<0.5	<0.5	<2	<1	<0.5	<0.5	<0.05	<1	<10	<500	<0.5	8	16	26	15	2	2.4	14	<5	0.03	<5	<25	16	23	6
91KC202	<5	<0.5	19	3	<1	4.7	3	1.7	<1	69	<500	0.6	60	68	9	25	10	<2	<5	<5	2.69	1028	<25	178	57	101
91KC204	<5	<0.5	20	4	<1	10	6.5	1.3	<1	180	<500	0.8	78	167	5	48	15	<2	45	<5	4.43	500	<25	1551	99	237
91KC205	<5	<0.5	2.9	5	5	34	3.7	2.1	<1	410	<500	<0.5	3	5	2	2	4	<2	<5	<5	0.93	46	<25	67	7	3
91KC208	<5	<0.5	8.3	<2	<1	4.9	12	0.64	<1	81	<500	1.4	41	298	18	39	12	<2	29	<5	2.36	304	<25	708	70	576
91KC211	<5	<0.5	13	3	<1	7.4	13	0.45	<1	170	<500	0.9	80	72	26	18	8	<2	220	<5	2.51	303	<25	1928	90	605
91KC212	<5	<0.5	<0.5	<2	<1	<0.5	<0.5	<0.05	<1	<10	<500	0.9	<1	2	<1	1	1	<2	<5	<5	0.03	42	<25	18	14	<2
91KC213	<5	<0.5	3	<2	<1	6.4	2.2	0.8	<1	53	<500	0.8	603	40	<1	11	8	<2	<5	<5	0.89	219	<25	239	20	17
91KC214	<5	<0.5	1.6	4	3	35	9.4	2.2	<1	240	<500	0.8	69	26	<1	5	2	<2	7	<5	0.53	188	<25	328	10	9
91KC215	<5	<0.5	14	4	1	15	4.2	4.2	<1	83	<500	<0.5	18	89	<1	33	45	<2	17	<5	3.99	1106	<25	83	28	141
91KC216	<5	<0.5	14	4	1	11	3	4.4	<1	140	640	1	9	21	<1	7	9	<2	8	<5	2.55	276	<25	663	37	134
91KC224	<5	<0.5	17	<2	<1	<0.5	<0.5	0.21	<1	<10	<500	1.5	7	15	3	1608	84	<2	72	16	4.55	678	<25	12	870	44
91KC238	<5	<0.5	3.2	<2	<1	<0.5	<0.5	0.7	<1	<10	<500	0.7	3	10	<1	12	4	<2	<5	<5	0.76	317	<25	22	36	54
91kc239	<5	<0.5	7.3	<2	<1	5.1	2.1	0.15	<1	48	<500	0.7	36	100	<1	52	10	<2	<5	<5	4.22	400	<25	269	53	61
91KC242	<5	<0.5	52.6	3	<1	1.7	0.7	2.5	<1	17	<500	1.4	99	50	1	153	40	<2	50	7	5.75	965	<25	394	239	229
91KC246	<5	<0.5	1.2	<2	2	19	5.7	2	<1	610	<500	0.7	2	12	<1	3	2	<2	<5	7	0.46	107	<25	117	10	<2
91KC249	<5	0.7	2.5	<2	1	3.5	1.2	2.5	<1	270	<500	<0.5	<1	<2	<1	9	1	<2	59	7	0.22	67	<25	629	7	<2
91LB4b	<5	<0.5	15	3	<1	6.9	6.4	0.54	<1	150	<500	1.7	340	83	6	53	20	<2	<5	<5	5.09	519	<25	2000	84	233
91LB27	<5	<0.5	4.2	5	2	22	7.9	1.2	<1	340	<500	5.2	9	192	<1	4	3	<2	7	7	1.11	391	<25	562	9	11
91SL52	<5	<0.5	8	<2	<1	2.4	1.4	0.79	<1	32	<500	0.6	48	39	<1	19	11	<2	<5	<5	1.51	1634	<25	110	44	42
91SL54	<5	<0.5	0.6	<2	<1	<0.5	<0.5	0.67	<1	<10	<500	<0.5	<1	21	<1	8	3	<2	<5	<5	0.21	184	<25	32	13	6
91SL56a	<5	<0.5	0.9	<2	<1	7	1.3	<0.05	<1	140	<500	0.7	2	4	<1	4	<1	<2	<5	<5	0.4	62	<25	69	17	<2
91SL62a	<5	<0.5	0.7	<2	1	0.7	<0.5	5.02	<1	54	<500	0.8	<1	27	<1	6	<1	<2	<5	<5	0.1	56	<25	108	13	<2
91SL62b	<5	<0.5	0.5	<2	4	2.9	1	5.79	<1	220	<500	1	10	5	<1	6	4	<2	<5	<5	0.35	13	<25	629	10	<2
91SL62c	<5	<0.5	6.4	<2	<1	<0.5	0.7	0.15	<1	79	<500	<0.5	15	25	<1	1220	66	<2	26	7	3.68	792	<25	18	948	25
91SL62d	<5	<0.5	1	<2	<1	0.8	<0.5	4.1	<1	230	<500	0.6	<1	9	<1	46	4	<2	17	<5	0.62	121	<25	1464	22	3
91SL77	7	1.3	37	7	1	3.6	1.4	3.1	<1	60	<500	<0.5	27	79	<1	77	34	<2	<5	<5	7.52	1269	<25	671	154	140
91SL78	<5	<0.5	2.6	<2	<1	1.2	<0.5	0.31	<1	18	<500	0.7	2	16	<1	8	<1	<2	14	8	0.61	84	<25	123	30	20
91SL80	<5	<0.5	4.6	5	2	19	7.6	0.47	<1	350	<500	5.2	32	614	3	4	3	4.7	7	<5	2.03	447	<25	1280	12	11
91SL94b	<5	<0.5	0.8	<2	<1	5.4	1	<0.05	<1	110	<500	0.7	<1	21	<1	5	<1	<2	<5	<5	0.2	140	<25	49	25	4

Sample	Sn ICP PPM	W ICP PPM	Li ICP PPM	Ga ICP PPM	La ICP PPM	Ta ICP PPM	Ti ICP PCT	Al ICP PCT	Mg ICP PCT	Ca ICP PCT	Na ICP PCT	K ICP PCT	Nb ICP PPM	Sr ICP PPM	Y ICP PPM	Zr ICP PPM	Pb AA PPM	Bi AA PPM	B DCP PPM	Te AA PPM	Sn XRF PPM
91KC201	<20	<20	4	<10	9	<5	<0.01	0.05	<0.01	<0.01	0.05	0.02	<5	9	<5	<5	<2	2	<9	<0.2	6
91KC202	<20	<20	28	<10	9	173	0.3	3.37	1.49	0.54	1.46	1.11	7	141	19	44	9	2	<9	<0.2	6
91KC204	<20	<20	40	<10	22	963	0.42	5.18	3.09	9.96	1.3	1.73	20	399	19	19	6	4	<9	<0.2	<5
91KC205	<20	<20	19	<10	23	<5	0.06	5.68	0.06	0.08	1.97	1.54	29	15	7	63	25	1	<9	<0.2	9
91KC208	<20	<20	18	<10	11	<5	0.18	3.1	3.83	10	0.68	1.1	10	388	18	25	9	2	<9	<0.2	<5
91KC211	<20	<20	35	<10	12	<5	0.3	4.34	2.66	9.75	0.57	1.57	12	170	16	38	10	<1	<9	<0.2	<5
91KC212	<20	<20	4	<10	<5	193	<0.01	0.06	<0.01	0.04	0.04	0.02	<5	2	<5	<5	3	2	<9	<0.2	10
91KC213	<20	<20	9	<10	11	<5	0.07	1.63	0.19	0.55	0.72	0.67	5	64	7	8	27	<1	<9	<0.2	<5
91KC214	<20	<20	5	<10	16	<5	0.07	2.85	0.1	0.28	1.92	1.52	14	57	9	51	19	<1	<9	<0.2	9
91KC215	<20	<20	24	<10	13	238	0.46	2.32	0.62	2.97	3.58	0.96	15	366	14	32	12	2	<9	<0.2	8
91KC216	<20	104	24	<10	7	<5	0.53	6.15	0.41	0.35	3.55	1.33	14	591	9	44	10	2	<9	<0.2	6
91KC224	30	<20	7	<10	<5	<5	0.02	0.93	10	0.89	0.16	0.07	7	11	<5	<5	8	<1	na	na	<5
91KC238	<20	<20	10	<10	<5	<5	0.08	1.31	0.31	1.93	0.65	0.03	<5	47	<5	<5	5	2	<9	<0.2	15
91kc239	<20	<20	28	<10	9	<5	0.16	2.28	0.48	0.03	0.21	0.61	6	18	6	32	17	2	<9	<0.2	<5
91KC242	33	<20	12	<10	6	<5	0.51	3.89	4.42	7.85	1.69	0.41	14	306	10	<5	15	<1	na	na	<5
91KC246	<20	<20	44	<10	6	<5	0.05	3.39	0.05	0.25	1.67	1.58	9	44	9	37	27	3	<9	<0.2	16
91KC249	<20	<20	6	<10	<5	<5	0.02	3.5	0.07	0.29	1.67	1.63	<5	156	10	8	11	<1	na	na	<5
91LB4b	<20	<20	57	<10	11	<5	0.32	6.81	3.38	10	0.87	1.82	24	558	14	38	11	<1	<9	<0.2	13
91LB27	<20	<20	30	<10	13	<5	0.13	3.4	0.14	0.08	1.06	1.51	21	92	6	99	802	7	<9	1.7	14
91SL52	<20	<20	15	<10	9	<5	0.13	1.94	0.68	0.31	0.73	0.43	<5	56	16	24	14	2	<9	<0.2	<5
91SL54	<20	<20	2	<10	<5	<5	<0.01	0.8	0.15	3.35	0.57	0.05	<5	55	<5	<5	7	<1	<9	<0.2	<5
91SL56a	<20	<20	7	<10	6	<5	0.02	1.55	<0.01	0.03	0.1	0.67	<5	8	12	19	7	3	<9	<0.2	<5
91SL62a	<20	<20	7	<10	<5	<5	0.02	3.87	0.05	0.1	4.36	0.51	7	78	<5	13	<2	2	<9	<0.2	<5
91SL62b	<20	<20	6	<10	<5	<5	0.04	4.82	0.04	0.16	4.85	1.33	16	192	<5	19	12	2	<9	<0.2	<5
91SL62c	<20	<20	23	<10	<5	<5	0.01	0.58	10	1.39	0.09	0.34	<5	135	<5	<5	<2	4	<9	<0.2	<5
91SL62d	32	<20	74	<10	<5	<5	0.03	7.1	1.25	0.17	3.86	1.77	14	143	<5	21	<2	5	<9	<0.2	17
91SL77	<20	<20	13	<10	13	<5	0.99	5.45	3.35	6.7	2.2	0.9	23	387	23	142	3	2	<9	<0.2	7
91SL78	<20	<20	20	<10	<5	230	0.06	1.38	0.17	0.51	0.27	0.31	7	28	<5	176	3	<1	<9	<0.2	7
91SL80	<20	<20	43	<10	20	<5	0.13	6.04	0.21	0.05	0.65	1.84	32	59	9	190	1974	5	<9	2.5	16
91SL94b	<20	<20	68	<10	6	<5	0.01	1.04	0.03	0.02	0.06	0.62	<5	8	11	13	12	<1	<9	<0.2	11

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

SAMPLE DESCRIPTIONS

SAMPLE	BRIEF DESCRIPTION
91KC201	Quartz vein 5' wide intruding orthogneiss.
91KC202	Iron-stained phyllite
91KC204	Iron-stained schist interlayered with lt green calc-silicate.
91KC205	Quartz veining in orthogneiss.
91KC208	Dark gray to black hornfels adjacent to pluton.
91KC211	Calc-silicate with finely dissem. pyrrhotite(?).
91KC212	Quartz vein in pluton.
91KC213	Quartz vein in pluton with light green mineral and dark green chlorite(?).
91KC214	Felsic dike, 20' wide
91KC215	Iron-stained orthogneiss, yellow and white salts wx out of o/c.
91KC216	Similar to 215, more iron-stained and siliceous
91KC224	Green wx zone (30' wide) at contact of mafic volcanics and orthogneiss, chlorite(?).
91KC238	White quartz veins in graywacke.
91kc239	Iron-stained quartz in phyllite
91KC242	Fine-grained hornblende gabbro, finely dissem pyrrhotite(?), some magnetite
91KC246	Iron-stained biotite pegmatite.
91KC249	Pegmatite
91LB4b	Quartz with minor sulfides.
91LB27	Felsic volcanic with finely dissem sulfides from lead occurrence area.
91SL52	Iron-stained calcareous shale.
91SL54	Quartz-calcite vein in limestone.
91SL56a	Quartz vein near pluton /metasediment contact
91SL62a	Iron-stained quartz
91SL62b	Pegmatite
91SL62c	Volcanic
91SL62d	Quartz-muscovite schist
91SL77	Coarse granitic
91SL78	Quartz veins frm hornfelsed zone
91SL80	Rhyolite with finely dissem pyrite, sphalerite(?), and other sulfides.
91SL94b	Quartz vein.

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