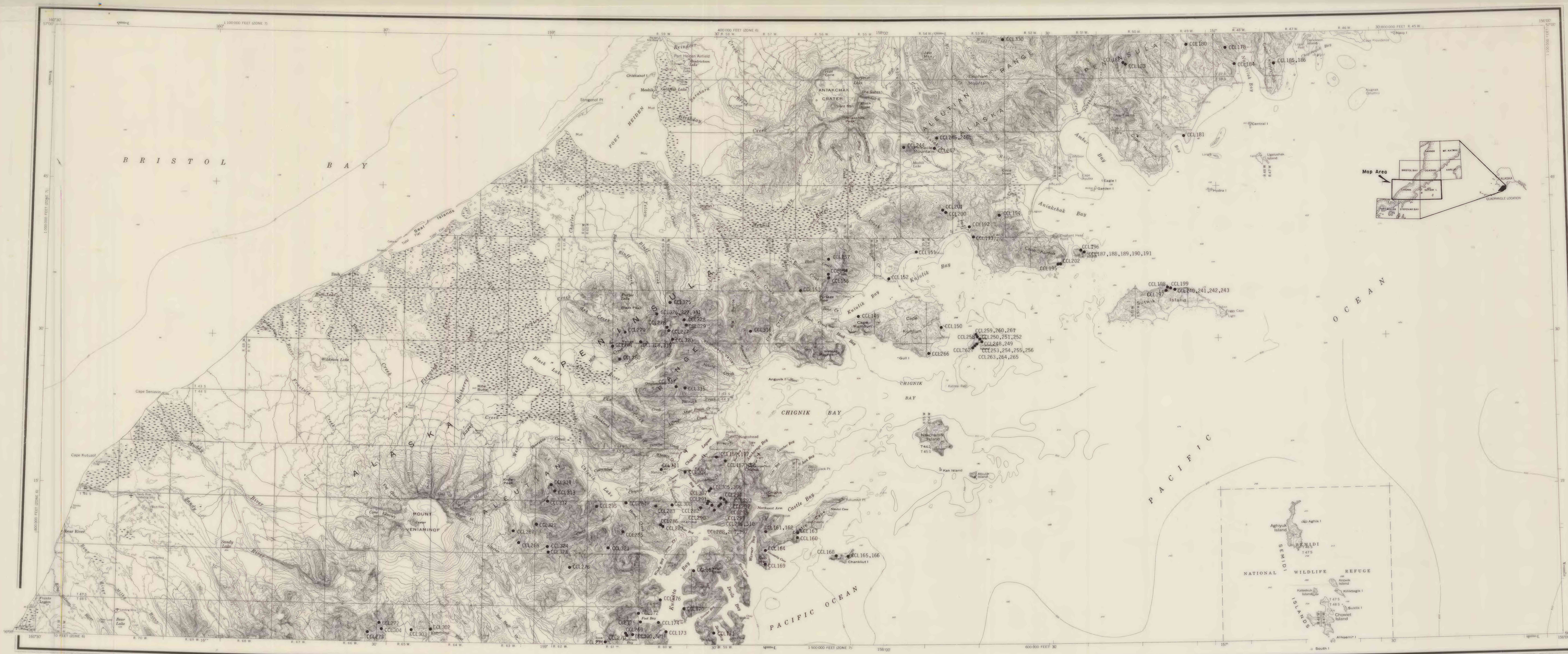

SCALE 1:250 000

5 0 5 10 15 20 25 MILES

5 0 5 10 15 20 25 KILOMETERS

CONTOUR INTERVAL FEET
DATUM IS MEAN SEA LEVEL

Semi-quantitative Spectrographic — Percent (FE%, MG%, CA%, TI%) — Parts Per Million — Atomic Absorption (CU, PB, ZN)

LAB NO.	FIELD NO.	LATITUDE	LONGITUDE	FE%	MG%	CA%	TI%	MN	AG	AS	AU	B	BA	BE	BI	CD	CO	CR	CU	LA	MO	NB	NI	PB	SB	SC	SN	SR	V	W	Y	ZN	ZR	CU	PB	ZN	Rock/Outcrop Description
CCL258	78Ws042	56 30 20	157 43 9	10.0	.70	2.00	.70	1,500	N	N	N	200	500	<1.0	N	N	50	150	200	50	N	<20	50	150	N	30	N	500	300	N	20	500	100	160	65	140	hornblende andesite porphyry
CCL259	78Ws043	56 30 25	157 43 12	15.0	3.00	3.00	.70	1,500	N	N	N	20	2,000	<1.0	N	N	50	150	100	50	N	<20	50	20	N	30	N	1,500	300	N	20	N	100	25	15	25	quartz sericite altered rock
CCL260	78Ws044A	56 30 29	157 43 12	10.0	3.00	5.00	.50	2,000	N	N	N	100	2,000	<1.0	N	N	50	100	100	50	N	<20	30	20	N	20	N	>5,000	300	N	20	<200	50	40	20	60	altered andesite
CCL261	78Ws044B	56 30 29	157 43 12	15.0	5.00	5.00	.70	2,000	N	N	N	100	1,500	<1.0	N	N	50	200	100	50	N	<20	50	150	N	30	N	1,500	500	N	20	<200	50	65	50	100	hornblende andesite porphyry
CCL262	78Ws045	56 29 13	157 44 0	10.0	3.00	5.00	.50	1,500	N	N	N	50	1,500	<1.0	N	N	20	20	20	50	N	<20	20	20	N	10	N	1,500	300	N	20	N	70	15	25	75	andesite sill
CCL263	78Ws048	56 29 32	157 43 32	20.0	.70	1.00	.30	1,000	3.0	1,000	N	100	700	1.0	N	N	50	20	300	50	N	<20	20	200	N	20	N	300	300	N	50	3,000	100	260	95	2,600	siltstone
CCL264	78Ws048A	56 29 32	157 43 29	10.0	.70	.30	1.00	700	N	N	N	500	1,500	2.0	N	N	20	100	100	50	N	<20	20	<10	N	20	N	300	300	N	50	<200	100	40	10	35	siltstone
CCL265	78Ws049	56 29 34	157 43 29	15.0	3.00	5.00	1.00	2,000	N	N	N	100	1,000	1.5	N	N	30	100	100	50	N	<20	20	20	N	30	N	1,000	500	N	50	<200	100	35	25	80	hornfelsed siltstone
CCL266	78Ws050	56 28 42	157 51 59	15.0	3.00	7.00	.70	1,500	N	N	N	50	1,000	<1.0	N	N	50	300	200	50	N	<20	50	20	N	50	N	1,000	500	N	50	N	70	90	10	70	andesite/basalt
CCL267	78Ws109	56 11 7	159 5 50	10.0	1.50	5.00	.50	1,500	N	N	N	10	700	<1.0	N	N	<5	<10	<5	50	N	<20	10	20	N	10	N	1,000	200	N	50	N	150	N	10	35	hornblende andesite porphyry
CCL268	78Ce135	56 9 50	158 4 48	15.0	3.00	7.00	.70	1,500	N	N	N	10	700	<1.0	N	N	100	200	150	50	N	<20	100	10	N	50	N	1,000	500	N	50	N	50	75	15	40	andesite rubble flow
CCL269	78Dt141	56 1 2	158 45 42	15.0	10.00	5.00	.70	1,000	N	N	N	10	2,000	<1.0	N	N	100	1,500	150	50	N	<20	300	10	N	50	N	1,000	500	N	50	N	50	40	30	55	felsic sill
CCL270	78Dt141A	56 0 52	158 45 29	5.0	2.00	2.00	.30	700	N	N	N	50	2,000	<1.0	N	N	10	70	10	50	N	<20	20	100	N	5	N	1,000	150	N	10	N	150	10	40	80	felsic sill
CCL271	78Dt142	56 0 10	158 49 15	15.0	3.00	2.00	1.00	2,000	N	N	N	<10	1,500	<1.0	N	N	50	20	10	50	N	<20	<5	20	N	50	N	300	300	N	100	N	200	5	20	110	gabbro
CCL272	78Mm014A	56 2 10	159 29 45	3.0	<.02	.10	.50	N	N	N	N	50	1,000	<1.0	N	N	<5	100	20	50	N	<20	<5	50	N	30	N	1,500	700	N	10	N	50	10	5	5	felsic intrusive rock
CCL273	78Mm015A	56 0 30	149 31 45	15.0	3.00	2.00	.70	1,500	N	N	N	100	500	<1.0	N	N	50	150	100	50	N	<20	50	200	N	30	N	300	500	N	20	<200	50	30	75	160	felsic intrusive rock
CCL276	78Dt147A	56 7 41	158 55 30	10.0	2.00	3.00	.70	1,000	N	N	N	20	1,500	<1.0	N	N	20	150	100	50	N	<20	50	10	N	20	N	5,000	300	N	20	N	100	35	15	50	andesite sill
CCL277	78Ws119	56 31 1	158 38 26	15.0	3.00	5.00	.70	2,000	N	N	N	20	1,000	<1.0	N	N	70	50	150	50	N	<20	50	20	N	30	N	1,000	700	N	50	N	70	40	10	30	altered diorite
CCL278	78Ws120	56 31 16	158 39 17	15.0	3.00	5.00	.70	2,000	N	N	N	20	700	<1.0	N	N	70	20	150	50	N	<20	20	20	N	30	N	1,000	700	N	50	N	300	50	15	30	altered igneous rock
CCL279	78Ws122A	56 30 53	158 45 60	10.0	3.00	5.00	.50	1,500	N	N	N	10	700	<1.0	N	N	70	100	100	50	N	<20	50	<10	N	20	N	1,000	500	N	30	N	50	65	15	50	altered hornblende diorite
CCL280	78Ws123	56 28 8	158 47 8	10.0	2.00	5.00	.50	1,500	N	N	N	20	1,000	<1.0	N	N	50	100	100	50	N	<20	20	10	N	20	N	1,000	500	N	20	N	100	45	10	25	hornblende dacite
CCL281	78Ws125	56 29 27	158 48 21	10.0	2.00	3.00	.50	1,000	N	N	N	10	2,000	<1.0	N	N	20	20	30	50	N	<20	15	20	N	10	N	700	500	N	20	N	100	20	10	30	hornblende dacite
CCL282	78Ws126	56 29 27	158 48 21	15.0	3.00	3.00	.70	2,000	N	N	N	10	700	<1.0	N	N	50	100	150	50	N	<20	50	30	N	20	N	1,000	500	N	50	N	200	20	30	80	altered basalt
CCL283	78Ws127	56 13 31	158 32 34	10.0	3.00	2.00	.70	1,500	N	N	N	10	1,000	<1.0	N	N	50	150	150	50	N	<20	50	10	N	20	N	1,000	500	N	50	N	200	45	15	40	andesite porphyry
CCL284	78Ws128	56 13 43	158 40 24	10.0	3.00	1.00	.50	1,500	N	N	N	10	1,500	<1.0	N	N	20	20	20	50	N	<20	20	10	N	15	N	700	200	N	50	N	300	15	15	45	andesite porphyry
CCL285	78Ws129	56 11 13	158 46 25	15.0	3.00	2.00	.70	1,500	N	N	N	10	1,500	<1.0	N	N	50	20	20	50	N	<20	20	10	N	20	N	1,000	300	N	50	N	200	15	15	55	andesite plug
CCL286	78Dt165	56 11 49	158 39 48	10.0	1.50	2.00	.50	200	N	N	N	20	700	<1.0	N	N	20	20	70	50	N	<20	20	20	N	20	N	500	300	N	30	N	300	20	15	30	andesite plug
CCL287	78Dt166	56 11 45	158 39 2	10.0	1.50	.50	.50	3,000	N	N	N	20	500	<1.0	N	N	20	30	50	50	N	<20	20	10	N	20	N	300	300	N	30	N	100	20	15	80	altered andesite
CCL288	78Dt167	56 13 48	158 30 30	10.0	2.00	1.50	.50	3,000	N	N	N	20	1,000	<1.0	N	N	<5	50	15	50	N	<20	20	50	N	20	N	1,000	300	N	20	N	150	10	25	110	altered hornblende diorite
CCL289	78Dt167A	56 13 48	158 30 30	10.0	2.00	1.50	.50	3,000	N	N	N	10	500	<1.0	N	N	<5	30	200	50	N	<20	30	20	N	20	N	1,000	300	N	20	N	150	85	15	110	diorite dike
CCL290	78Dt168	56 13 58	158 31 18	7.0	2.00	2.00	1.00	1,000	N	N	N	20	500	<1.0	N	N	10	150	30	50	N	<20	30	20	N	30	N	1,000	300	N	50	N	100	10	15	55	altered andesite
CCL291	78Dt168A	56 14 8	158 31 10	7.0	1.00	2.00	.70	1,000	N	N	N	20	300	<1.0	N	N	10	100	20	50	N	<20	20	20	N	20	N	1,000	200	N	20	N	200	10	15	25	altered andesite
CCL292	78Dt170	56 14 9	158 37 60	10.0	3.00	2.00	.70	1,000	N	N	N	20	700	<1.0	N	N	50	150	100	50	N	<20	50	50	N	30	N	1,000	300	N	50	N	100	55	30	90	diorite
CCL293	78Dt171	56 14 22	158 38 25	10.0	5.00	3.00	1.00	2,000	N	N	N	10	500	<1.0	N	N	50	300	30	50	N	<20	100	30	N	30	N	500	300	N	50	<200	200	15	20	80	hornfelsed andesite
CCL294	78Dt173	56 14 29	158 38 56	7.0	5.00	2.00	.70	700	N	N	N	10	700	1.0	N	N	50	300	30	50	N	N	150	100	N	30	N	700	300	N	50	N	N	15	30	35	diorite
CCL295	78Yb039	56 13 34	158 50 52	.2	.20	>20.00	.02	700	N	N	N	N	N	N	N	N	N	N	N	<20	N	<20	N	N	N	N	N	200	<10	N	N	N	200	<5	70	5	calcite vein
CCL296	78Yb043	56 13 22	158 30 8	10.0	5.00	5.00	1.00	1,000	N	N	N	10	700	<1.0	N	N	50	300	100	50	N	<20	150	<10	N	30	N	1,000	300	N	50	N	200	35	20	55	andesite
CCL297	78Yb045	56 13 48	158 30 18	10.0	2.00	.30	.70	200	N	N	N	200	700	1.0	N	N	N	70	70	50	20	<20	10	20	N	20	N	500	300	N	20	N	100	30	15	10	altered volcanic rock
CCL298	78Rh007	56 13 50	158 28 45	10.0	7.00	7.00	1.00	1,500	N	N	N	<10	100	N	N	N	50	1,000	100	50	N	<20	200	<10	N	50	N	500	500	N	50	N	100	40	15	10	altered volcanic rock
CCL299	78Rh008	56 13 45	158 29 5	7.0	3.00	2.00	.70	300	N	N	N	1,000	500	<1.0	N	N	20	20	200	50	100	<20	30	20	N	20	N	500	300	N	20	N	100	200	15	30	volcanic rock
CCL300	78Ce140A	56 1 52	158 44 30	5.0	2.00	1.50	.30	500	N	N	N	200	700	1.0	N	N	10	20	10	50	N	<20	15	50	N	5	N	1,000	100	N	10	N	70	5	25	50	felsic plutonic rock
CCL301	78Ce140B	56 1 52	158 44 30	3.0	.50	1.50	.30	500	N	N	N	500	700	1.0	N	N	<5	20	5	50	N	<20	10	30	N	5	N	200	100	N	50	N	20	10	25	50	altered felsic plutonic rock
CCL302	78Ce142A	56 1 23	159 20 12	15.0	5.00	7.00	.70	2,000	N	N	N	20	500	N	N	N	100	150	150	50	N	<20	50	20	N	50	N	1,000	700	N	50	N	200	80	20	45	andesite porphyry
CCL303	78Ce144	56 1 25	159 23 59	15.0	3.00	5.00	.70	2,000	N	N	N	20	1,000	<1.0	N	N	70	<10	70	50	N	<20	<5	20	N	50	N	700	700	N	50	N	150	35	10	25	andesite
CCL304	78Ce145A	56 1 15	158 28 53	7.0	3.00	5.00	.50	1,500	N	N	N	20	1,000	<1.0	N	N	50	100	70	50	N	<20	30	20	N	30	N	500	500	N	50	N	150	35	10	20	andesite tuff
CCL305	78Ws130	56 15 37	158 30 28	7.0	2.00	2.00	.50	1,500	N	N	N	20	700	<1.0	N	N	30	70	20	50	N	<20	30	<10	N	20	N	300	300	N	50	N	150	20	20	55	altered andesite
CCL306	78Ws131	56 15 30	158 30 29	10.0	3.00	3.00	.50	1,500	N	N	N	10	500	<1.0	N	N	50	100	50	50	N	<20	50	20	N	20	N	700	300	N	50	N	150	30	20	55	altered andesite dike
CCL307	78Ws132	56 15 17	158 30 56	10.0	3.00	3.00	.50	1,000	N	N	N	20	700	<1.0	N	N	50	100	30	50	N	<20	100	15	N	20	N	1,000	300	N	50	N	150	20	15	45	altered intrusive
CCL308	78Ws133	56 13 46	158 37 40	10.0	3.00	5.00	.70	1,000	N	N	N	10	1,000	<1.0	N	N	70	100	100	50	N	<20	50	15	N	30	N	1,000	500	N	50	N	150	30	20	65	andesite
CCL309	78Ws134	56 17 7	158 35 13	10.0	3.00	5.00	.50	1,000	N	N	N	10	700	<1.0	N	N	70	100	50	50	N	<20	100	15	N	20	N	1,000	300	N	50	N	100	25	10	15	basalt
CCL310	78Yb044	56 13 25	158 30 14	7.0	.30	.05	1.00	200	N	N	N	50	700	1.0	20	N	<5	200	30	50	N	<20	<5	50	N	30	50	N	500	N	20	<200	200	20	30	5	altered volcanic rock
CCL311	78Yb048	56 17 20	158 39 38	1.0	.10	<.05	1.00	200	N	N	N	200	300	<1.0	N	N	<5	100	20	50	<5	<20	10	50	N	20	N	300	300	N	20	<200	300	15	25	5	carbonaceous shale
CCL312	78Ws140	56 14 7	158 59 46	3.0	.70	.15	.30	100	N	N	N	50	1,000	<1.0	N	N	<5	50	5	50	N	<20	10	<10	N	5	N	300	200	N	<10	N	50	<5	10	5	altered sedimentary rock
CCL313	78Ws141	56 15 6	158 58 35	10.0	3.00	3.00	1.00	1,000	N	N	N	10	700	<1.0	N	N	50	200	100	50	N	<20	100	50	N	30	N	1,000	300	N	50	N	100	35	20	70	slate
CCL314	78Ws142	56 15 36	158 59 1	10.0	3.00	3.00	1.00	2,000	N	N	N	100	1,500	<1.0	N	N	50	150	100	50	N	<20	50	20	N	30	N	1,500	300	N	50	200	100	50	20	280	altered andesite dike
CCL315	78Dt182	56 25 25	158 35 25	7.0	1.50	3.00	.50	1,000	N	N	N	20	1,000	1.0	N	N	15	100	30	50	N	<20	30	30	N	20	N	300	200	N	20	N	50	5	5	15	sandstone
CCL316	78Ws144	56 30 50	158 23 51	5.0	1.50	3.00	.50	200	N	N	N	20	1,000	<1.0	N	N	15	100	300	50	N	<20	20	<10	N	20	N	500	200	N	10	N	50	300	10	15	altered diorite
CCL317	78Ws149	56 25 31	158 37 5	10.0	2.00	3.00	1.00	1,500	N	N	N	20	200	<1.0	N	N	15	300	20	50	N	<20	50	20	N	30	N	200	500	N	100	N	200	15	20	40	sandstone
CCL318	78Dt187	56 30 0	158 43 25	10.0	2.00	.70	.70	150	N	N	N	50	1,000	1.0	N	N	10	50	50	50	N	<20	15	15	N	30	N	200	300	N	50	N	150	20	10	10	altered hornblende dacite
CCL319	78Dt188	56 29 50	158 43 30	7.0	1.50	2.00	.50	300	N	N	N	10	700	<1.0	N	N	10	50	50	50	N	<20	10	20	N	20	N	500	300	N	<10	N	50	20	15	25	altered gabbro
CCL320	78Yb061	56 30 9	158 37 42	10.0	3.00	3.00	.70	1,500	N	N	N	10	1,500	<1.0	N	N	50	100	150	50	N	<20	20	30	N	30	N	1,000	500	N	50	N	100	65	15	45	altered diorite
CCL321	78Yb068	56 9 27	158 49 38	10.0	3.00	3.00	.70	1,500	N	N	N	10	1,500	<1.0	N	N	50	200	200	50	N	<20	50	20	N	30	N	3,000	700	N	30	N	50	100	25	70	andesite dike
CCL322	78Dt202	56 11 49	159 1 40	7.0	.30	.70	.50	1,500	N	N	N	50	1,000	2.0	N	N	<5	20	<5	50	N	<20	<5	15	N	10	N	200	20	N	70	N	300	<5	10	45	altered andesite
CCL323	78Dt209	56 9 0	158 59 20	7.0	.20	.30	.50	1,500	N	N	N	20	2,000	2.0	N	N	<5	20	<5	50	15	<20	<5	15	N	10	N	1,000	20	N	70	N	300	<5	10	70	sandstone
CCL324	78Yb077B	56 9 41	158 59 31	10.0	2.00	2.00	.50	1,500	N	N	N	10	2,000	<1.0	N	N	20	50	50	50	N	<20	20	15	N	15	N	3,000	300	N	20	N	30	25	20	80	sandstone
CCL325	78Yb097	56 33 39	158 37 40	7.0	1.00	5.00	.30	2,000	N	N	N	100	2,000	<1.0	N	N	20	100	10	50	N	<20	50	20	N	10	N	300	200	N	20	N	50	10	20	50	sandstone
CCL326	78Dt242B	56 32 39	158 40 25	10.0	3.00	5.00	.70	2,000	N	N	N	20	700	<1.0	N	N	50	50	50	50	N	<20	20	10	N	30	N	700	500	N	50	N	150	25	20	40	altered volcanic rock
CCL327	78Dt241	56 32 39	158 40 36	10.0	3.00	5.00	.50	1,500	N	N	N	20	700	<1.0	N	N	50	50	70	50	N	<20	15	20	N	30	N	700	500	N	50	N	100	30	20	55	andesite dike
CCL328	78Mm060	56 31 53	158 35 18	10.0	2.00	1.00	.50	500	N	N	N	20	1,000	<1.0	N	N	<5	100	150	50	50	<20	10	<10	N	20	N	300	500	N	20	N	70	75	10	15	
CCL329	78Mm061	56 31 38	158 35 8	10.0	.70	.50	.50	500	N	5,000	N	30	1,000	<1.0	20	N	70	50	1,000	50	N	<20	10	1,500	<100	20	N	<100	300	N	20	2,000	70	25	850	900	
CCL330	78Dt261	56 59 55	157 37 50	7.0	1.50	.70	.50	500	N	N	N	20	2,000	1.0	N	N	15	70	70	50	N	<20	10	50	N	20	N	500	200	N	50	N	200	20	35	130	conglomerate
CCL331	78Dt242A	56 32 36	158 40 26	10.0	2.00	2.00	.50	1,500	N	N	N	200	700	<1.0	N	N	70	70	100	50	N	<20	20	20	N	30	N	700	500	N	50	N	150	25	20	45	altered volcanic rock

Semi-quantitative Spectrographic — Percent (FE%, MG%, CA%, TI%) — Parts Per Million — Atomic Absorption (CU, PB, ZN)

LAB NO.	FIELD NO.	LATITUDE	LONGITUDE	FE%	MG%	CA%	TI%	MN	AG	AS	AU	B	BA	BE	BI	CD	CO	CR	CU	LA	MO	NB	NI	PB	SB	SC	SN	SR	V	W	Y	ZN	ZR	CU	PB	ZN	Rock/Outcrop Description
CCL149	78Ws056	56 32 28	158 4 17	10.0	2.00	5.00	.70	1,500	N	N	N	20	1,000	1.0	N	N	20	20	150	50	N	<20	20	20	N	20	N	1,000	500	N	20	N	100	25	10	70	andesite
CCL150	78Ws058	56 30 26	157 49 23	10.0	2.00	5.00	.70	1,000	N	N	N	30	1,000	1.0	N	N	20	50	150	50	N	<20	30	20	N	20	N	1,000	500	N	20	N	100	45	15	60	hornblende basalt
CCL151	78Ws060	56 38 38	157 54 6	7.0	2.00	5.00	.70	1,000	N	N	N	30	1,000	1.0	N	N	20	70	150	50	N	<20	100	20	N	20	N	1,500	300	N	15	N	150	70	10	30	basalt dike
CCL152	78Ws061	56 36 4	157 58 55	10.0	2.00	5.00	.70	1,000	N	N	N	30	1,000	1.0	N	N	20	100	50	50	N	<20	50	20	N	20	N	1,000	300	N	20	N	100	20	10	50	gabbro
CCL153	78Ws064	56 34 56	158 15 2	10.0	2.00	.50	.70	700	N	N	N	150	1,000	1.0	N	N	30	150	50	50	N	<20	150	20	N	20	N	1,000	300	N	50	N	300	15	20	90	sandstone
CCL154	78Dt100	56 36 32	158 9 50	15.0	2.00	.70	.70	1,000	N	N	N	200	1,000	1.0	N	N	30	150	150	50	N	<20	150	20	N	20	N	1,500	500	N	50	<200	200	50	25	100	sandstone
CCL155	78Dt101	56 36 18	158 9 45	20.0	5.00	3.00	.70	2,000	N	N	N	20	500	<1.0	N	N	50	300	150	50	N	<20	150	20	N	50	N	500	700	N	50	N	100	65	25	60	volcanic rock
CCL157	78Ws075	56 18 2	158 28 20	20.0	3.00	2.00	.70	2,000	N	N	N	20	300	<1.0	N	N	50	150	150	50	N	<20	100	20	N	30	N	300	500	N	50	N	100	35	20	65	andesite
CCL158	78Ws075D	56 18 2	158 28 20	20.0	3.00	5.00	.70	2,000	N	N	N	20	700	<1.0	N	N	50	100	150	50	N	<20	70	20	N	30	N	1,000	500	N	50	N	50	20	15	25	andesite tuff
CCL159	78Ws077A	56 18 37	158 29 46	15.0	3.00	1.50	.70	2,000	N	N	N	20	200	<1.0	N	N	50	300	150	50	N	<20	200	30	N	30	N	500	500	N	50	N	50	55	30	60	altered sandstone
CCL160	78Yb011	56 10 37	158 15 26	15.0	2.00	.50	.70	1,000	N	N	N	200	1,000	2.0	N	N	30	200	150	50	N	<20	150	30	N	20	N	200	500	N	50	<200	100	50	35	110	shale
CCL161	78Yb013A	56 11 0	158 20 38	15.0	2.00	2.00	.70	700	N	N	N	20	700	2.0	N	N	50	50	500	50	N	<20	30	20	N	30	N	300	300	N	50	N	50	480	20	25	altered andesite
CCL162	78Yb013B	56 11 0	158 20 38	10.0	3.00	1.50	.50	1,000	N	N	N	20	500	1.0	N	N	20	20	200	50	N	<20	20	20	N	20	N	300	300	N	50	N	50	160	15	40	altered andesite
CCL163	78Ws082	56 11 0	158 15 24	20.0	3.00	2.00	.70	2,000	N	N	N	30	1,000	1.0	N	N	50	20	20	50	N	<20	10	20	N	30	N	1,500	500	N	50	N	100	10	20	75	andesite
CCL164	78Dt122A	56 9 15	158 20 49	15.0	2.00	1.00	.70	1,000	N	N	N	200	1,000	1.0	N	N	30	200	150	50	N	<20	100	20	N	30	N	200	500	N	50	N	200	30	15	90	quartzite
CCL165	78Yb016C	56 8 47	158 6 15	10.0	1.00	2.00	.50	1,000	N	N	N	50	500	1.0	N	N	20	20	20	50	N	<20	20	20	N	15	N	200	200	N	50	N	100	15	15	65	altered volcanic rock
CCL166	78Yb016B	56 8 47	158 6 15	10.0	1.50	3.00	.70	1,500	N	N	N	70	500	1.0	N	N	20	30	50	50	N	<20	20	20	N	20	N	200	300	N	50	N	150	10	20	75	altered volcanic rock
CCL167	78Dt131	56 7 18	158 33 40	7.0	.70	2.00	.70	1,000	N	N	N	50	500	1.0	N	N	20	20	15	50	N	<20	5	20	N	15	N	200	200	N	50	N	150	50	25	55	felsic dike
CCL168	78Ws084	56 8 47	158 8 30	15.0	3.00	5.00	.70	2,000	N	N	N	100	500	<1.0	N	N	50	500	150	50	N	<20	150	20	N	30	N	500	500	N	50	N	100	35	25	45	altered andesite
CCL169	78Ws087	56 7 57	158 21 2	15.0	3.00	5.00	.70	1,500	N	N	N	20	300	1.0	N	N	50	100	150	50	N	<20	50	20	N	30	N	500	500	N	50	N	200	45	25	70	andesite dike
CCL170	78Ws091	56 3 37	158 35 26	20.0	5.00	7.00	.70	2,000	N	N	N	20	300	<1.0	N	N	70	700	150	50	N	<20	200	20	N	30	N	700	500	N	50	N	100	35	20	85	slate
CCL171	78Yb021	56 1 8	158 30 7	15.0	2.00	.50	.70	1,000	N	N	N	200	1,500	1.0	N	N	30	150	150	50	N	<20	100	20	N	30	N	300	500	N	50	N	150	20	10	20	biotite quartz monzanite
CCL172	78Ws100	56 2 58	158 43 33	15.0	2.00	.50	1.00	700	N	N	N	200	1,000	1.0	N	N	50	200	300	50	N	<20	300	50	N	30	N	200	500	N	50	N	300	45	30	110	felsic dike
CCL173	78Ws103	56 1 16	158 38 16	2.0	1.00	2.00	.20	700	N	N	N	30	500	1.0	N	N	<5	<10	<5	50	N	<20	15	20	N	<5	N	500	20	N	<10	N	50	N	15	35	felsic rock
CCL174	78Ws105	56 2 9	158 40 3	7.0	1.50	1.00	.50	700	N	N	N	20	700	<1.0	N	N	20	100	30	50	N	<20	100	20	N	20	N	200	200	N	50	N	100	10	15	45	hornfelsed sandstone
CCL175	78Ws136	56 2 10	158 43 2	7.0	3.00	2.00	.50	1,000	N	N	N	50	500	<1.0	N	N	20	20	50	50	N	<20	20	20	N	20	N	1,000	200	N	50	N	100	30	20	65	felsic dike
CCL176	78Ws137	56 4 28	158 39 35	10.0	2.00	7.00	.30	5,000	N	N	N	50	300	<1.0	N	N	10	70	30	50	N	<20	30	50	N	10	N	500	200	N	50	<200	50	20	60	65	siltstone
CCL177	78Ws110	56 18 35	158 29 47	7.0	.50	1.50	.50	1,000	N	N	N	30	500	1.0	N	N	20	20	30	50	N	<20	20	20	N	15	N	200	200	N	50	N	100	20	10	60	altered andesite porphyry
CCL178	78Dt008	56 58 32	156 58 10	10.0	2.00	5.00	.70	1,500	N	N	N	200	150	1.0	N	N	50	200	100	50	N	<20	100	20	N	30	N	500	300	N	50	<200	100	30	30	85	altered volcanic sedimentary rock
CCL180	78Dt031	56 59 8	157 4 57	7.0	.70	2.00	.50	1,000	N	N	N	100	100	1.0	N	N	50	100	100	50	N	<20	100	20	N	20	N	300	300	N	20	500	100	40	15	180	altered diorite
CCL181	78Dt033	56 50 4	157 5 40	10.0	1.50	3.00	.70	1,000	N	N	N	200	500	<1.0	N	N	50	150	150	50	N	<20	100	20	N	30	N	300	300	N	50	N	70	50	20	100	altered sandstone
CCL182	78Dt040	56 57 10	157 16 60	15.0	3.00	5.00	.70	1,000	N	N	N	20	500	<1.0	N	N	70	500	200	50	N	<20	100	20	N	50	N	700	300	N	50	N	50	120	15	20	altered hornblende diorite
CCL183	78Dt041	56 57 2	157 16 20	10.0	3.00	5.00	.70	1,500	N	N	N	100	300	<1.0	N	N	70	200	150	50	N	<20	100	20	N	50	N	700	500	N	50	<200	50	75	20	65	altered hornblende diorite
CCL184	78Ce017	56 54 51	156 57 52	10.0	1.00	.50	.50	700	N	N	N	100	1,000	1.0	N	N	20	100	30	50	N	<20	100	20	N	20	N	200	300	N	50	<200	100	15	15	70	sandstone
CCL185	78Ws008A	56 56 54	156 49 9	7.0	1.00	1.00	.70	1,000	N	N	N	20	700	2.0	N	N	10	20	10	50	N	<20	5	20	N	30	N	700	200	N	70	<200	200	5	15	60	rhyolite tuff
CCL186	78Ws008B	56 56 54	156 49 9	5.0	.70	1.00	.70	1,000	N	N	N	20	700	2.0	N	N	10	20	10	50	N	<20	5	20	N	20	N	700	100	N	70	<200	200	5	20	80	rhyolite tuff
CCL187	78Dt049C	56 38 35	157 23 43	7.0	1.00	2.00	.50	1,000	N	2,000	N	150	200	1.0	N	N	20	150	200	50	N	<20	50	20	N	30	N	500	300	N	30	N	50	120	15	40	altered dike
CCL188	78Dt049D	56 38 36	157 23 48	15.0	2.00	7.00	.50	1,500	N	7,000	N	200	200	1.0	N	N	15	20	200	50	N	<20	30	20	N	20	N	300	300	N	50	N	50	100	25	25	altered dike
CCL189	78Dt049E	56 38 36	157 23 50	10.0	2.00	2.00	.50	1,000	N	2,000	N	100	1,000	1.0	N	N	100	200	300	50	N	<20	100	20	N	30	N	500	300	N	50	N	100	130	15	25	altered dike
CCL190	78Dt049F	56 38 38	157 23 58	10.0	2.00	2.00	.50	1,500	N	N	N	150	300	1.0	N	N	30	70	300	50	N	<20	50	20	N	30	N	700	300	N	50	N	70	130	20	35	altered dike
CCL191	78Dt049G	56 38 40	157 23 60	10.0	3.00	3.00	.50	1,500	N	N	N	150	1,000	<1.0	N	N	30	150	150	50	N	<20	100	20	N	30	N	1,000	300	N	50	N	50	70	15	25	altered dike
CCL192	78Dt053	56 41 9	157 44 25	15.0	3.00	5.00	.70	1,500	N	N	N	100	500	N	N	N	70	150	150	50	N	<20	100	30	N	50	N	700	500	N	70	N	100	45	30	70	volcanic rock
CCL193	78Dt054	56 40 10	157 43 50	10.0	2.00	3.00	.50	2,000	N	N	N	100	1,000	<1.0	N	N	30	150	150	50	N	<20	30	50	N	30	N	500	300	N	50	<200	100	25	30	85	altered volcanic rock
CCL194	78Dt059	56 42 18	157 39 15	10.0	2.00	3.00	.50	2,000	N	N	N	20	500	<1.0	N	N	50	100	150	50	N	<20	30	20	N	30	N	700	500	N	50	N	70	65	20	40	volcanic breccia
CCL195	78Ws015	56 37 29	157 28 23	7.0	1.00	2.00	.30	2,000	N	N	N	50	1,000	<1.0	N	N	10	20	20	50	N	<20	20	20	N	10	N	700	200	N	20	<200	70	10	20	100	andesite sill
CCL196	78Ws017	56 38 48	157 24 25	15.0	5.00	5.00	.50	2,000	N	N	N	10	500	N	N	N	50	500	300	50	N	<20	150	20	N	50	N	700	700	N	30	N	30	120	25	55	hornblende andesite porphyry
CCL197	78Dt068	57 4 45	157 9 15	10.0	1.50	3.00	.50	1,500	N	N	N	70	1,500	1.0	N	N	30	150	150	50	N	<20	150	20	N	20	N	1,000	300	N	30	N	200	70	15	75	altered dacite porphyry
CCL198	78Dt068A	56 35 0	157 8 60	10.0	2.00	5.00	.50	2,000	N	N	N	70	1,000	1.0	N	N	30	200	150	50	N	<20	150	20	N	20	N	1,000	300	N	30	N	100	65	20	35	altered dacite porphyry
CCL199	78Dt068B	56 34 55	157 8 30	15.0	2.00	1.50	.50	1,500	N	N	N	20	1,000	1.0	N	N	50	200	200	50	N	<20	200	20	N	20	N	300	300	N	20	N	100	75	20	55	altered dacite porphyry
CCL200	78Ws022	56 42 42	158 48 42	7.0	1.50	.70	.50	1,000	N	N	N	70	1,000	1.0	N	N	10	50	70	50	N	<20	15	20	N	20	N	300	300	N	30	N	100	25	20	50	altered basalt
CCL201	78Ws023	56 42 49	158 49 13	15.0	1.50	7.00	.50	2,000	N	N	N	200	700	1.0	N	N	20	50	150	50	N	<20	20	20	N	20	N	500	500	N	50	N	100	40	25	70	altered basalt
CCL202	78Ws016	56 37 27	158 28 13	10.0	2.00	5.00	.50	1,500	N	N	N	20	500	1.0	N	N	20	150	30	50	N	<20	70	150	N	20	N	1,000	300	N	20	N	70	20	60	110	dacite dike
CCL240	78Dt069	56 34 50	157 7 60	7.0	2.00	5.00	.50	700	N	N	N	30	700	1.0	N	N	50	150	100	50	N	<20	50	20	N	20	N	1,000	300	N	30	N	100	50	10	20	altered volcanic breccia
CCL241	78Dt069A	56 34 49	157 7 50	10.0	1.50	3.00	.50	300	N	N	N	30	1,500	1.0	N	N	50	150	100	50	N	<20	50	20	N	30	N	1,000	300	N	30	N	100	40	10	15	altered volcanic breccia
CCL242	78Dt069B	56 34 49	157 7 40	5.0	1.50	3.00	.50	700	N	N	N	20	700	1.0	N	N	20	150	70	50	N	<20	50	<10	N	20	N	500	200	N	20	N	70	50	15	40	altered volcanic breccia
CCL243	78Dt069C	56 34 50	157 7 30	15.0	3.00	7.00	.70	1,500	N	N	N	20	1,500	<1.0	N	N	70	500	150	50	N	<20	100	30	N	30	N	1,000	300	N	50	N	100	60	10	60	dike
CCL244	78Ws035	56 49 6	157 56 13	7.0	1.50	3.00	.50	1,000	N	N	N	20	1,000	1.0	N	N	20	20	20	50	N	<20	20	20	N	10	N	1,000	200	N	50	N	100	50	15	40	hornblende diorite porphyry
CCL245	78Ws038	56 44 44	157 50 23	7.0	1.50	5.00	.10	700	N	N	N	50	700	<1.0	N	N	20	150	50	50	N	<20	20	10	N	30	N	1,000	500	N	30	300	50	25	15	140	basalt/andesite
CCL246	78Ws039	56 49 41	157 50 28	15.0	1.50	3.00	.70	200	N	N	N	20	500	<1.0	N	N	50	70	70	50	N	<20	20	10	N	30	N	700	300	N	50	<200	50	40	15	80	altered basalt
CCL247	78Ws041	56 49 1	157 50 45	10.0	1.00	5.00	1.00	500	N	N	N	50	300	<1.0	N	N	20	70	70	50	N	<20	15	10	N	30	N	700	700	N	50	<200	50	40	20	50	altered basalt
CCL248	78Dt079A	56 30 2	157 42 28	10.0	3.00	5.00	.70	1,500	N	N	N	20	1,000	<1.0	N	N	20	300	200	50	N	<20	100	20	N	20	N	1,500	300	N	20	<200	50	190	15	55	hornblende andesite
CCL249	78Dt079B	56 30 7	157 42 29	15.0	3.00	5.00	.70	1,000	N	N	N	20	700	<1.0	N	N	20	300	150	50	N	<20	100	15	N	20	N	1,500	300	N	20	N	100	130	20	45	hornblende andesite
CCL250	78Dt080A	56 30 10	157 42 40	15.0	3.00	7.00	.70	1,500	N	N	N	20	1,500	<1.0	N	N	50	150	50	50	N	<20	70	20	N	30	N	1,500	300	N	20	<200	100	15	15	120	hornblende andesite
CCL251	78Dt080B	56 30 14	157 42 50	10.0	2.00	5.00	.70	700	N	N	N	20	700	1.0	N	N	20	100	700	50	N	<20	15	20	N	20	N	1,500	300	N	20	N	100	760	15	75	hornblende andesite
CCL252	78Dt080C	56 30 18	157 42 55	10.0	1.00	1.00	.70	200	N	N	N	150	1,000	<1.0	N	N	50	100	20	50	N	<20	20	10	N	30	N	1,000	300	N	50	N	100	15	15	25	hornblende andesite
CCL253	78Dt081A	56 29 45	157 42 50	10.0	2.00	2.00	.50	700	N	N	N	10	700	<1.0	N	N	20	100	1,000	50	N	<20	50	20	N	20	N	1,500	300	N	20	N	70	680	15	70	altered andesite dike
CCL254	78Dt081B	56 29 40	157 43 0	7.0	2.00	3.00	.50	1,000	N	N	N	10	700	1.0	N	N	15	50	100	50	N	<20	20	30	N	15	N	1,500	300	N	20	<200	50	55	15	60	altered andesite dike
CCL255	78Dt081C	56 29 38	157 43 5	10.0	2.00	3.00	.70	300	N	N	N	200	200	<1.0	N	N	20	20	200	50	N	<20	50	20	N	20	N	200	500	N	30	<200	70	140	20	30	hornfels
CCL256	78Dt081D	56 29 35	157 43 12	>20.0	.05	.05	.20	<10	N	2,000	N	50	100	<1.0	N	N	<5	<10	150	50	N	<20	50	20	200	<5	N	300	200	N	<10	1,000	20	60	35	360	altered sedimentary rock
CCL257	78Dt085	56 37 59	158 9 40	15.0	2.00	2.00	.70	1,500	N	N	N	20	1,000	<1.0	N	N	50	100	50	50	N	<20	20	20	N	30	N	700	300	N	50	<200	100	25	15	75	sandstone

Sample collection

Samples are primarily single grab samples, although a few are composite. In many cases the samples were chosen because of obvious mineralization or alteration of the outcrop, thus the reader is cautioned that the sample population is heavily biased in favor of mineralized areas. No attempt has been made in this report to differentiate those samples selected to provide background data. Field No. refers to year sample was collected (1978), collecting geologist (Dt, Robert Detterman; Ce, James Case; Mm, Thomas Miller; Rh, Donald Richter; Yb, Elizabeth Yount; and Ws, Frederic Wilson), and field number of the individual geologist.

Sample preparation and analytical procedures

Samples were crushed to minus 0.25 inches (minus 6.35 mm) using a chipmunk crusher. Each sample was split and one fraction ground to minus 150 mesh using a vertical pulverizer with ceramic plates.

Samples were analyzed for thirty elements with a DC-arc emission spectrograph using a six-step, semiquantitative method described by Grimes and Marranzino (1968). In addition, an atomic absorption spectrophotometric method described by Ward and others (1969) was used to determine the concentration of copper, lead, and zinc.

Explanation of data

For the semiquantitative spectrographic analyses, results were reported as six steps per order of magnitude (1.0, 1.5, 2.0, 3.0, 5.0, and 7.0, or powers of ten of these numbers). These values are approximate midpoints of the class intervals shown below.

Reported value	Class interval limits
1.0	0.83 - 1.2
1.5	1.2 - 1.8
2.0	1.8 - 2.6
3.0	2.6 - 3.8
5.0	3.8 - 5.6
7.0	5.6 - 8.3

The precision of the semiquantitative spectrographic method has been evaluated by Motooka and Grimes (1976). Repeatability of a determination within plus or minus one and two reporting value(s) is approximately 83 and 96 percent respectively.

Analyses done by the atomic absorption method are not reported on the six step scale thus they are more precise than the spectrographic analyses.

Analytical data are shown in Table 1, using the following symbols. An "N" indicates the particular element was not detected in the sample. A less-than symbol (<) followed by a value means the element was present but in an amount below the lower limit of determination. A greater-than symbol (>) followed by a value means the element was present in an amount exceeding the upper limit of determination. All data reported in parts per million unless otherwise indicated.

References cited

Grimes, D. J., and Marranzino, A. P., 1968, Direct-current arc and alternating-current spark emission spectrographic field methods for the semiquantitative analyses of geologic materials: U.S. Geol. Survey Circ. 591, 6p.

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Ward, F. N., Nakagawa, H. M., Harms, T. F., and Van Sickle, G. H., 1969, Atomic absorption methods of analyses useful in geochemical exploration: U.S. Geological Survey Bull. 1289, 45p.

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SAMPLE LOCATION MAP AND ANALYTICAL DATA FOR ROCK SAMPLES COLLECTED IN 1978 , CHIGNIK AND SUTWIK ISLAND QUADRANGLE, ALASKA

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This report is preliminary and has not been edited or reviewed for conformity with Geological Survey standards and nomenclature.