Public-data File 84-10

UPPER O'CONNOR CREEK GEOCHEMICAL SURVEY, FAIRBANKS QUADRANGLE

By

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July 1983

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MEMORANDUM State of Alaska

DEPARTMENT OF NATURAL RESOURCES
DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS

TO: Ross Schaff
State Geologist

DATE: July 15, 1983

FILE NO:

THRU: Red White, Chief
Resource Analysis Section

TELEPHONE NO: 474-7147

FROM: Karen Clautice
Geological Assistant

SUBJECT: Sampling survey of proposed O'Connor Creek subdivision

Attached are the results of a sampling survey conducted in May over the proposed O'Connor Creek subdivision (located in fig. 1). The study was done in an effort to better assess the mineral potential of this parcel which is underlain by the Cleary Sequence that hosts most of the lode gold and antimony mineralization in the Fairbanks District. Copies of the correspondence between DGGS and DLWM regarding this subdivision over the last two years has also been included.

Sampling and Analytical Procedures

Samples collected within and adjacent to the subdivision (Fig. 2) included 150 soil, 14 stream sediment, and five pan-concentrates. Soil samples were collected at about 100 ft intervals along four lines through the property. Samples were taken at an 8 to 10 in. depth beneath the vegetative mat and above frozen ground within the B soil horizon. Stream sediment and pan-concentrate samples were collected from creeks which drain this hillside property.

Analyses were made by the DGGS, Public Assay Laboratory under the direction of M. Wiltse. Samples were analyzed for the elements lead, antimony and arsenic by atomic absorption and for copper, zinc, cobalt, nickel, iron, manganese, bismuth, cadmium, and chromium by inductively coupled plasma techniques.

Personnel from DLWM assisted DGGS in the collection of soil samples as well as in the preparation of samples for analysis.

Results and Discussion

All sample results are listed in table 1. Of interest are the antimony and arsenic values (table 2), trace elements most indicative of lode gold and antimony mineralization in the Fairbanks District. These elements are anomalously high when compared with average trace element concentrations found in soils (Levinson, 1980, pp. 864-889). Average arsenic content in soils is listed as 5 ppm, ranging from 1 to 50 ppm and average antimony content is 5 ppm (Levinson, 1980). Arsenic values in this study ranged from below the analytical detection limit of 10 ppm to 149 ppm, and antimony from below the detection limit of 1 ppm to 103 ppm. Forty-five percent of the arsenic values in this study are above the detection limit of 10 ppm, with 10 percent above 50 ppm. Twenty-seven percent of the antimony values are above 5 ppm. A higher percentage of

anomalous arsenic than antimony would be expected due to arsenic's greater mobility in a secondary environment and thus wider dispersion halo about mineralization. The distribution of antimony and arsenic values are shown in the histograms in figures 3 and 4. High arsenic and antimony values are found on each of the four sampling lines.

Only one soil survey in the Fairbanks district was found to compare with these results. This is an arsenic study on Ester Dome (Hawkins, and others, 1982) that includes a line of soil samples across the highly mineralized Ryan Lode gold deposit. The samples were analyzed only for arsenic, but their range of values is similar to those at O'Connor Creek. The Ester samples ranged from 18 ppm to 148 ppm over 1500 ft within the B horizon. M. Wiltse has assured me that although the analytical techniques were somewhat different in the two studies, the values are comparable in the ranges above 20 ppm and within an accuracy of ±25 percent. No comparable published studies were located in areas of known antimony mineralization in the Fairbanks District. Of interest would be a soil survey across the Scrafford antimony mine three miles northeast of the O'Connor Creek area.

Stream sediment and pan-concentrate samples show highest arsenic and antimony values in Monte Cristo Creek, which drains the eastern third of the subdivision. The significance of the range of values for these 14 stream sediment and five pan-concentrate samples is not known. When compared visually with stream sediment values taken throughout the district (Albanese, 1982) these numbers do not seem particularly high, but then detailed sampling on a known mineralized creek on Ester Dome (Hawkins, 1982) produced values close to this range.

A stream sediment sample taken during this study at the mouth of Hattie Creek showed <10 ppm and did not duplicate an earlier reported analysis of 100 ppm (Albanese, 1983) at about the same location.

Because the Clear-y Sequence has been reported to have a distinct magnetic signature, a magnetic survey was attempted along the north -south road traversing the subdivision to better define these rocks on this heavily vegetated hillside; but magnetic activity was too high the day of the survey to obtain reproducible results.

Conclusion and Recommendations for Further Study

Available data indicates a high potential for lode gold and antimony mineralization on this hillside within the boundaries of the subdivision. Evidence includes:

1. Dual anomalies of antimony and arsenic in soil samples - the elements most closely associated with lode gold and antimony mineralization in the Fairbanks District.

2. Comparable arsenic content in soil samples taken within the same package of rocks (the Cleary Sequence) over the Ryan lode gold deposit on Ester Dome.

3. Proximity of known mineralization in this area as outlined in previous memos.

To better evaluate the mineral potential of the property, background soil geochemistry within the Cleary Sequence is needed as well as trace element concentrations in soils overlying known mineral deposits in this package of rocks. For instance, a soil line across the nearby Scrafford antimony deposit would be most useful for comparison. A statistical analysis of available geochemistry would also be helpful.

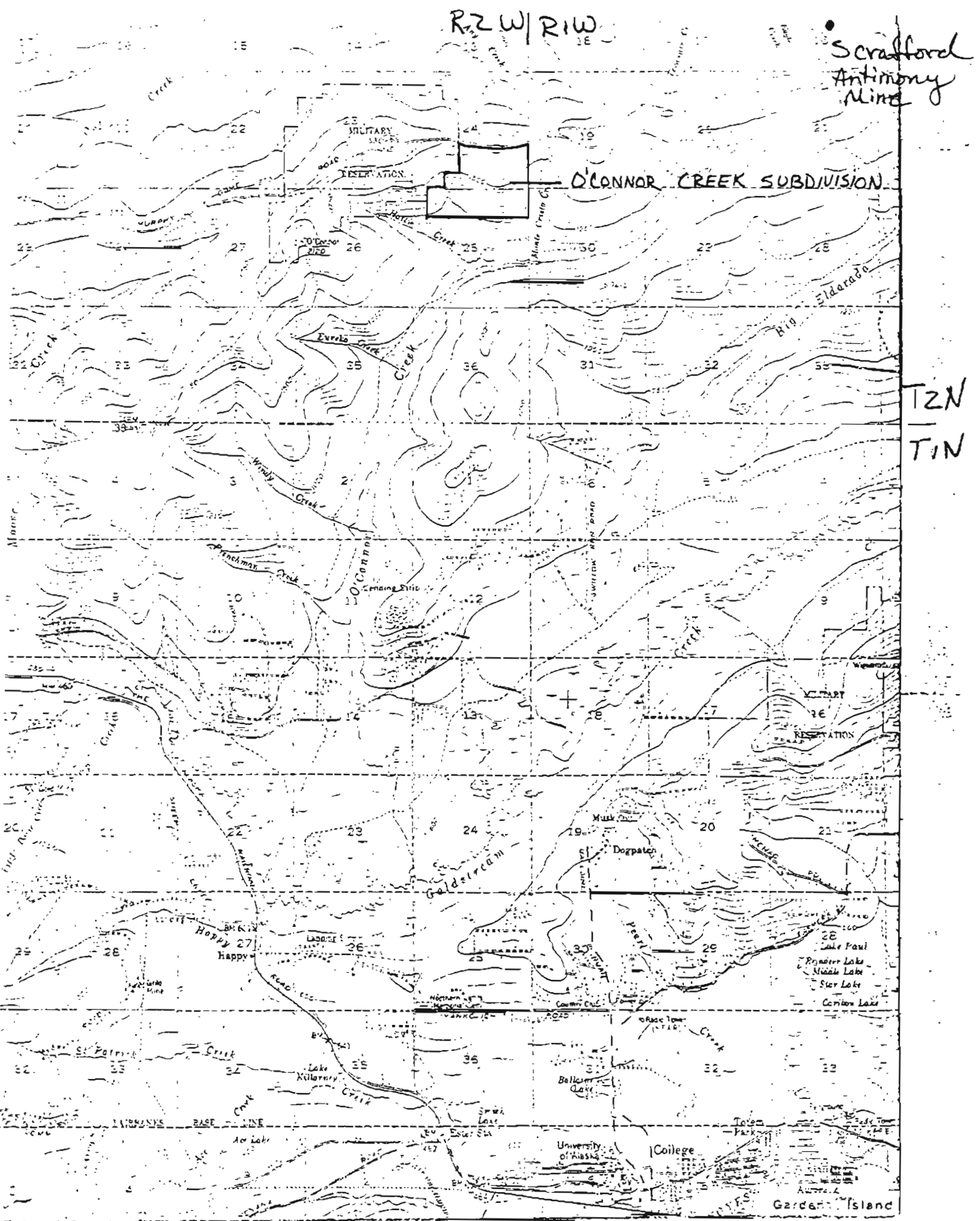
Additional study on this property should include: 1) a tighter sampling grid to better define the suspected mineralization, 2) another magnetic survey in an effort to delineate the Clear-y Sequence rocks, and 3) an EM-VLF survey to identify clay and fault gouge often associated with mineralized structures. VLF has proven useful elsewhere within the district and could quickly be accomplished over a soil grid.

References

Albanese, M.D., 1982. Geochemical reconnaissance of the northern Fairbanks D-2 and southern Livengood A-2 quadrangles, Alaska; summary of data on stream-sediment, pan-concentrate, and rock samples. Alaska Division of Geological and Geophysical Surveys, Open-file Rept. 165, 23 p.

Hawkins', D.B., 1982. Hierarchiacal analysis of variance of stream-sediment samples for geochemical reconnaissance, Ester Dome, Fairbanks Mining District, Alaska. Alaska Division of Geological and Geophysical Surveys, Open-file Rept. 167, 86p.

Hawkins, B., and others, 1982. Arsenic in the water, soil, bedrock and plants of the Ester Dome area of Alaska. University of Alaska, Institute of Water Resources, Report IWR-103, 82 p.



Base from: USGS Fairbanks D-2 Quadrangle

Figure 1 Location map

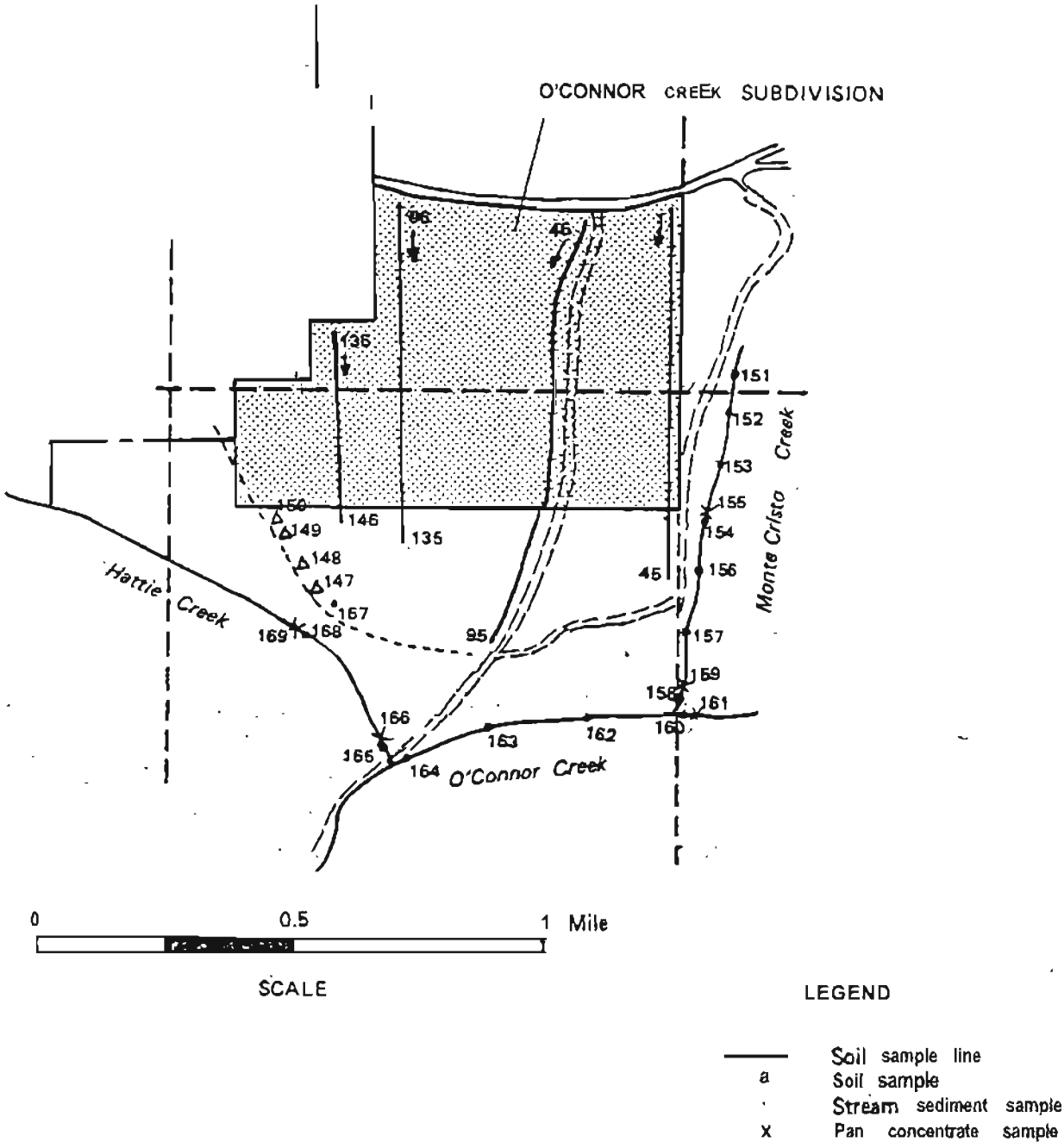


Figure 2. SAMPLE LOCATION MAP

Figure 3 Antimony in soil samples.

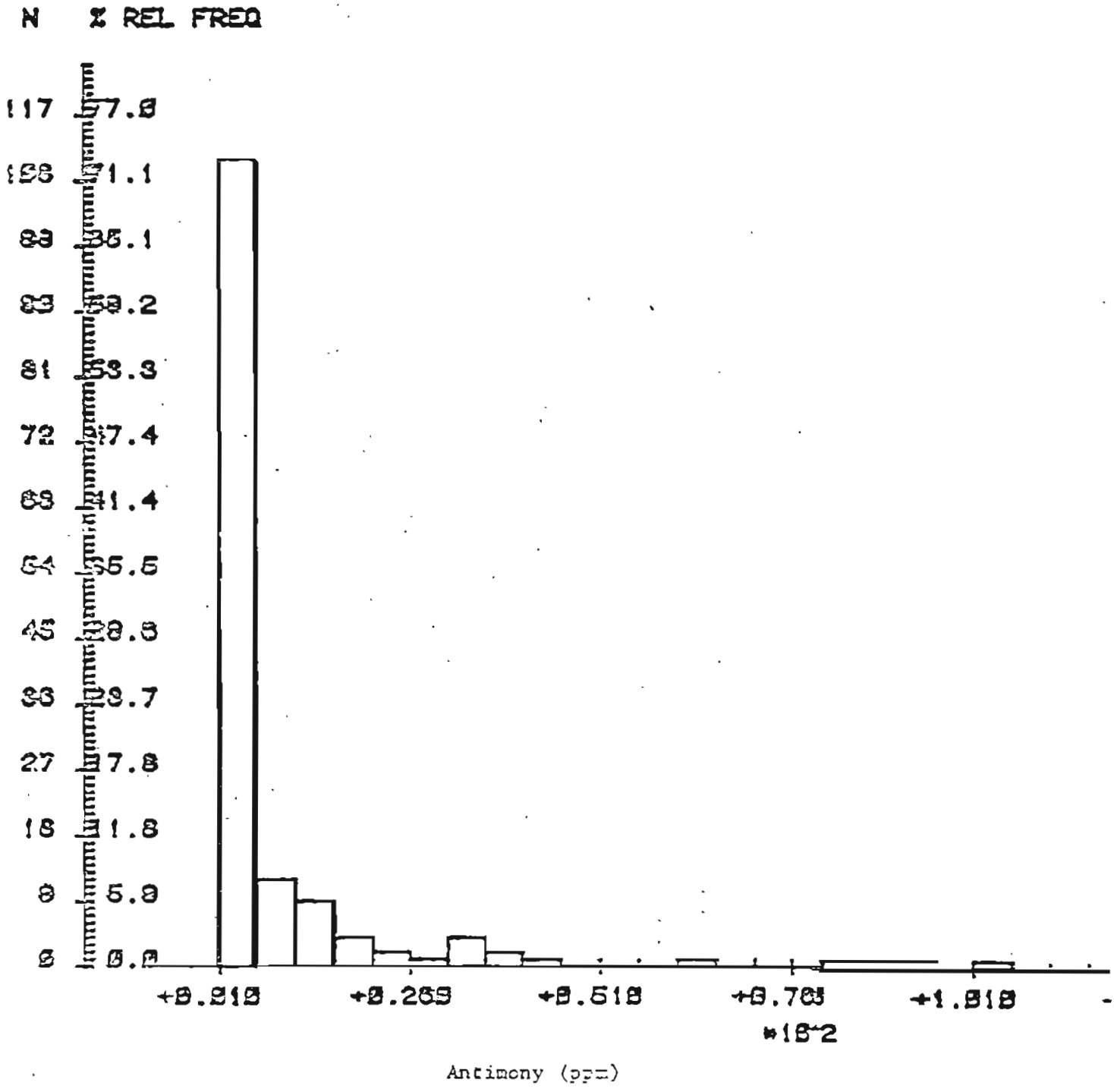
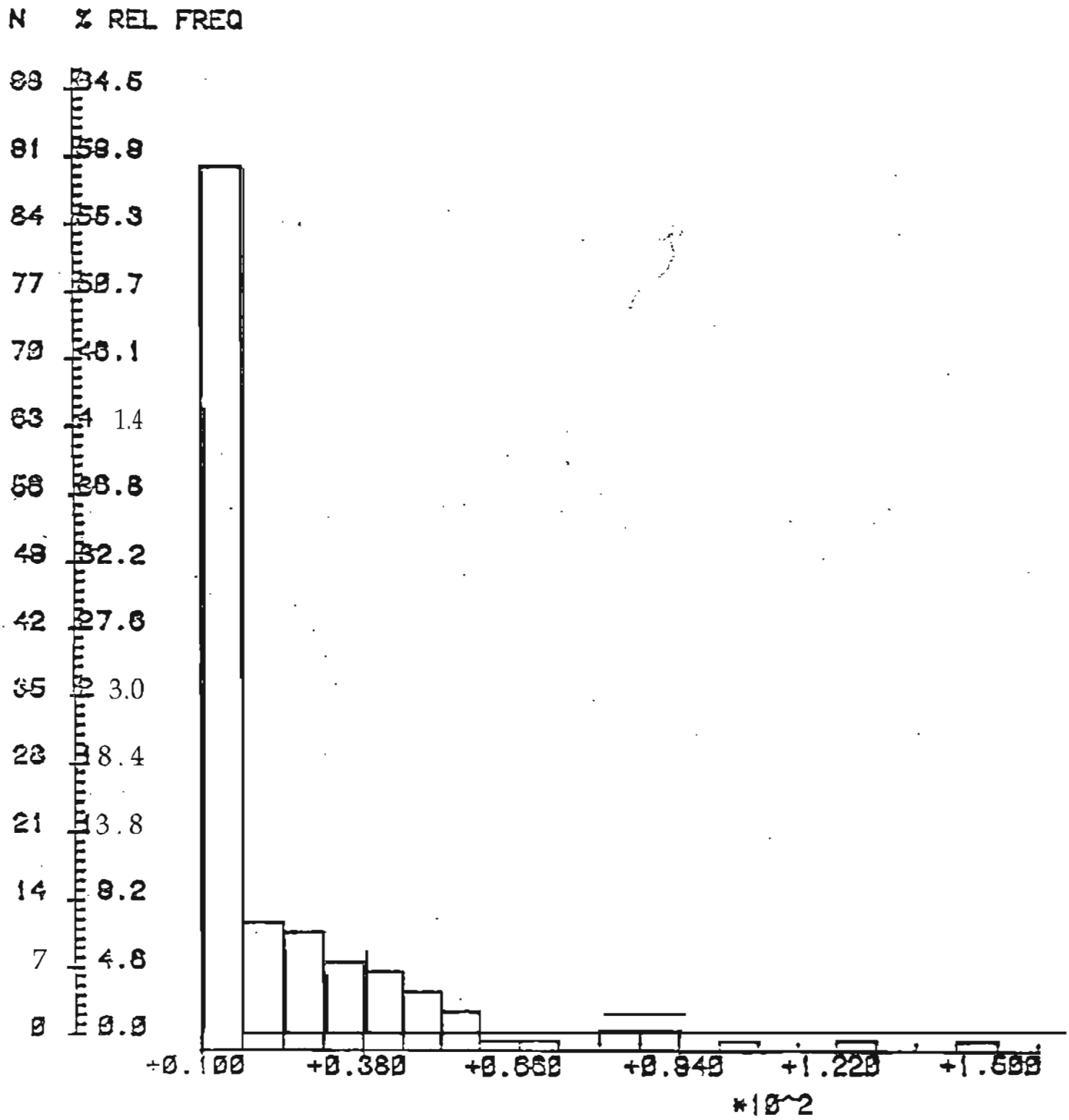


Figure 7. Arsenic in soil samples.



Arsenic (ppm)

Table 2. Arsenic and antimony analyses.

O' CONNOR SUBDIVISION

Soil Samples

MAP NO.	Sb	As
1	31	27
2	95	< 10
3	2	<10
4	3	<10
5	<1	<10
6	<1	< 10
7	3	< 10
8	2	< 10
9	Cl	< 10
10	19	88
11	45	55
12	5	< 10
13	9	< 10
14	6	<10
15	3	<10
16	3	22
17	61	70
18	32	35
19	31	51
20	37	56
21	35	47
22	21	40
23	38	83
24	20	31
25	14	< 10
26	10	< 10
27	6	<10
28	20	45
29	12	< 10
30	2	<10
31	5	39
32	<1	< 10
33	<1	410
34	<1	< 10
35	<1	<10
36	<1	410
37	<1	<10
38	<1	< 10
39	<1	<10
40	<1	< 10
41	<1	< 10

Soil Samples (cont'd)

MAP NO.	Sb	As
42	< 1	< 10
43	< 1	< 10
44	< 1	< 10
45	< 1	< 10
46	< 1	< 10
47	< 1	22
48	22	10
49	< 1	< 10
50	90	59
51	103	84
52	85	44
53	< 1	< 10
54	5	17
55	10	25
56	4	21
57	7	12
58	7	18
59	8	25
60	16	22
61	5	37
62	26	55
63	14	42
64	10	27
65	14	45
66	13	32
67	7	21
68	3	24
69	< 1	29
70	< 1	30
71	< 1	25
72	< 1	48
73	< 1	44
74	< 1	39
75	< 1	36
76	< 1	29
77	5	51
78	< 1	10
79	< 1	< 10
80	< 1	10
81	< 1	< 10

Soil Samples (cont'd)

MAP NO.	Sb	As
82	< 1	< 10
83	< 1	< 10
84	< 1	< 10
85	< 1	< 10
86	< 1	< 10
87	< 1	18
88	< 1	< 10
89	< 1	< 10
90	< 1	< 10
91	< 1	10
92	< 1	< 10
93	< 1	< 10
94	< 1	< 10
95	< 1	< 10
96	< 1	21
97	< 1	< 10
98	< 1	< 10
99	< 1	106
100	Cl	149
101	< 1	40
102	< 1	21
103	< 1	30
104	15	58
105	11	93
106	15	122
107	8	42
108	11	33
109	9	37
110.	< 1	28
111	< 1	17
112	< 1	21
113	< 1	18
114	< 1	< 10
115	< 1	< 10
116	< 1	< 10
117	< 1	< 10
118	< 1	< 10
119	< 1	< 10

Soil Samples (cont'd)

MAP NO.	Sb	As
120	< 1	< 10
121	< 1	< 10
122	< 1	< 10
123	< 1	< 10
124	< 1	< 10
125	< 1	< 10
126	< 1	12
127	< 1	< 10
128	< 1	< 10
129	< 1	< 10
130	< 1	< 10
131	< 1	< 10
132	< 1	< 10
133	< 1	14
134	< 1	< 10
135	< 1	< 10
136	< 1	< 10
137	< 1	< 10
138	< 1	< 10
139	< 1	< 10
140	2	< 10
141	5	30
142	3	36
143	< 1	31
144	< 1	< 10
145	< 1	< 10
146	< 1	< 10
147	< 1	< 10
148	< 1	< 10
149	< 1	< 10
150	< 1	< 10

Stream Sediment Samples

MAP NO.	Sb	As
151	< 1	36
152	6	73
153	< 1	25
154	< 1	34
156	< 1	23
157	< 1	< 10
158	< 1	15
160	< 1	13
162	< 1	< 10
163	< 1	16
164	< 1	17
165	< 1	< 10
167	< 1	< 10
168	< 1	< 10

Pan Concentrate Samples

MAP NO.	Sb	As
155	27	21
159	< 1	< 10
161	< 1	11
166	8	13
169	< 1	< 10

TABLE 1. O'CONNOR ANALYSIS

Soil Samples

ELEMENTS SIDE 1: (Cu Pb Zn Au Ag Mo Sb Sn W Hg As Co Ni Fe Mn B Ba Be Bi Cd Ca)

ELEMENTS SIDE 2: Cr Ga La As Sc Sr Th Ti U V Zr

Others: ____

METHODS: 1-AAS 4-XRF 2-E-SPEC 5-COLOR 3-ICP 6-ALT. LAB

BATCH NO. 810/a

SAMPLE TYPE E

DATE IN 4/28 DATE OUT 6/9/83 AA 10 June

SHIPMENT NO./DATE ____

Map No.	FIELD NO.	LAB NO.	Cu	Pb	Zn	Au	Ag	Mo	Sb	Sn	W	Hg	As	Co	Ni	Fe	Mn	B	Ba	Be	Bi	Cd	Ca
1	1-1	L 110 63	67	16	172				31					12	57	4%	5579				<5	<1	48
2	1-2	L 110 64	27	16	32				9					<10	12	1520	87				<5	<1	15
3	1-3	L 110 65	23	10	46				1					<10	16	21600	141				<5	<1	17
4	1-4	L 110 66	91	11	52				3					<10	31	17700	195				<5	<1	19
5	1-5	L 110 67	18	9	29				<1					<10	11	19000	98				<5	<1	13
6	1-6	L 110 68	54	14	39				<1					<10	25	22700	116				<5	<1	28
7	1-7	L 110 69	17	10	38				3					<10	14	21300	120				<5	<1	15
8	1-8	L 110 70	21	11	49				2					<10	20	22100	156				<5	<1	19
9	1-9	L 110 71	31	11	37				<1					<10	19	22100	126				<5	<1	17
10	1-10	L 110 72	17	8	46				19					60	17	19000	143				<5	<1	15
11	1-11	L 110 73	29	13	72				46					35	17	21700	120				<5	<1	14
12	1-12	L 110 74	16	9	35				5					<10	13	22700	111				<5	<1	14
13	1-13	L 110 75	11	13	26				9					<10	<10	15700	79				<5	1	<10
14	1-14	L 110 76	12	13	25				6					<10	<10	12600	67				<5	2	11
15	1-15	L 110 77	11	11	23				3					<10	<10	11600	62				<5	1	<10
		L																					
		L 110 70 dup	12	9	18				<1					<10	<10	8870	47				<5	2	<10
		L																					
		L																					
		L																					

GEOL./PROJECT KC/O'Connor

ELEMENTS SIDE 1
Cu Pb Zn Au Ag Mo Sb Sn
W Hg As Co Ni Fe Mn B
Ba Be Bi Cd Cr

ELEMENTS SIDE 2
Ca Ge La Li Sc Se Te Th
Ti U V Y Zr
Other:

METHODS
1-AAS 4-XRF
2-E-SPEC 5-COLOR
3-ICP 6-ALT. LAB

BATCH NO. 811/0
SAMPLE TYPE E
DATE IN 5/26/83 DATE OUT 6/9/83
SHIPMENT NO./DATE 10-June ICP

	FIELD NO.	LAB NO.	Cu	Pb	Zn	Au	Ag	Mo	Sb	Sn	W	Hg	As	Co	Ni	Fe	Mn	B	Ba	Be	Bi	Cd	Cr
16	1-16	L 110 78	12	11	20				3				22	<10	<10	9900	51				<5	1	<10
17	1-17	L 110 79	12	9	22				6				70	<10	<10	10000	59				<5	<1	40
18	1-18	L 110 80	11	10	26				3				35	<10	<10	11200	78				<5	<1	<10
19	1-19	L 110 81	10	9	28				3				51	<10	10	12600	83				<5	<1	<10
20	1-20	L 110 82	18	9	54				3				50	<10	18	27100	174				<5	<1	18
21	1-21	L 110 83	19	9	57				3				47	<10	19	30200	196				<5	<1	24
22	1-22	L 110 84	17	9	49				2				40	<10	17	30300	156				<5	<1	22
23	1-23	L 110 85	18	9	57				3				50	<10	19	30200	190				<5	<1	22
24	1-24	L 110 86	21	8	56				2				70	<10	18	27100	190				<5	<1	20
25	1-25	L 110 87	23	8	53				11				<10	<10	18	26500	153				<5	<1	21
26	1-26	L 110 88	17	7	53				10				<10	<10	18	27900	158				<5	<1	20
27	1-27	L 110 89	18	7	57				6				<10	<10	19	28600	162				<5	<1	19
28	1-28	L 110 90	22	8	56				20				45	<10	20	30300	205				<5	<1	23
29	1-29	L 110 91	28	8	65				12				<10	<10	24	34700	325				<5	<1	30
30	1-30	L 110 92	17	7	54				2				<10	<10	18	27600	201				<5	<1	21
		L																					
		L 11080 dup	20	9	49				3				29	<10	15	24900	143				<5	<1	16
		L 11090 dup	24	9	60				2				44	<10	20	31000	221				<5	<1	24
		L CC1	24	16	34				72				795	<10	16	57700	71				<5	<1	23
		L																					

GEOL./PROJECT KC/O'Connor

16

ELEMENTS SIDE 1
Cu Pb Zn Au Ag Mo Sb Sn
W Hg As Co Ni Fe Mn B
Ba Be Bi Cd Cr

ELEMENTS SIDE 2
Cr Co La Mg Sc S Te Th
Ti U V Y Zr
Other: _____

METHODS
1-AAS 4-XRF
2-[illegible]-PES 5-COLOR
3-ICPS-June 6-ALT. LAB

BATCH NO. 820
SAMPLE TYPE E
DATE IN 5/26/83 DATE OUT 6/9/83 AA 10-June ICP
SHIPMENT NO./DATE 6/5/83

	FIELD NO.	LAB NO.	Cu	Pb	Zn	Au	Ag	Mo	Sb	Sn	W	Hg	As	Co	N	Fe	Mn	B	Ba	Be	Bi	Cd	Cr
31	1-31	L 11093	19	8	58				5				39	<10	19	31300	180				<5	<1	21
32	1-32	L 11094	16	8	51				<1				<10	<10	16	25900	176				<5	<1	23
33	1-33	L 11095	17	7	48				<1				<10	<10	17	21500	175				<5	2	15
34	1-34	L 11096	17	7	52				<1				<10	<10	18	24400	205				<5	<1	19
35	1-35	L 11097	14	7	51				<1				<10	<10	16	25700	175				<5	<1	21
36	1-36	L 11098	19	7	56				<1				<10	<10	19	27400	200				<5	<1	19
37	1-37	L 11099	21	9	45				<1				<10	<10	16	23100	138				<5	<1	17
38	1-38	L 11100	22	7	49				<1				<10	<10	18	25800	150				<5	2	18
39	1-39	L 11101	19	6	55				<1				<10	11	22	23700	172				<5	4	27
40	1-40	L 11102	22	7	59				<1				<10	<10	21	27200	196				<5	1	22
41	1-41	L 11103	23	7	62				<1				<10	11	22	25300	254				<5	2	25
42	1-42	L 11104	22	8	65				<1				<10	<10	21	30500	183				<5	2	24
43	1-43	L 11105	23	8	65				<1				<10	<10	20	25200	182				<5	<1	15
44	1-43.5	L 11106	25	7	63				<1				<10	10	23	27400	217				<5	1	23
45	1-44	L 11107	24	7	61				<1				<10	<10	21	26900	269				<5	<1	23
		L																					
		L 11100 dup	20	7	46				<1				<10	<10	16	24800	156				<5	<1	20
		L																					
		L																					
		L																					

GEOL./PROJECT KC/Corcoran

8

ELEMENTS SIDE 1
Cu Pb Zn Au Ag Mo Sb Sn
W Hg As Co Ni Fe Mn B
Ba Be Bi Cd Ce

ELEMENTS SIDE 2
Cr Ge La Mg Sc Sb Te Th
Ti U V Y Zr
Others

METHODS
1-AAS 4-XRF
2-E-SPEC 5-COLOR
3-ICP 8-ALT. LAB

BATCH NO. 813/0
SAMPLE TYPE 5
** TEIN 5/24/83 DATE OUT 6/6/83
SHIPMENT NO./DATE

	FIELD NO.	LAB NO.	Cu	B	Zn	Au	Ag	Mo	Sb	Sn	W	Hg	As	Co	Ni	Fe	Mn	B	Ba	Be	Bi	Cd	Cr / Ge
46	Z-1	L 11108	24	<	51				<1				<10	<10	30	31600	188				<5	<1	23
47	Z-2	L 11109	25	1	55				<1				22	<10	21	29400	185				<5	<1	17
48d	Z-3	L 11110	24	1	62				22				10	10	29	37300	270				<5	<1	19
49	Z-4	L 11111	20	1	47				<1				<10	<10	18	30300	160				<5	<1	26
50	Z-5	L 11112	16	1	43				90				59	<10	16	24100	133				<5	<1	17
51	Z-6	L 11113	26	1	67				103				84	10	28	31500	354				<5	<1	27
52	Z-7	L 11114	17	1	43				85				44	<10	14	25000	114				<5	<1	20
53	Z-8	L 11115	37	1	27				<1				<10	<10	14	16500	65				<5	<1	<10
54	Z-9	L 11116	21	1	45				5				17	<10	20	25300	144				<5	<1	22
55	Z-10	L 11117	56	1	38				10				25	40	21	24300	111				<5	<1	15
56	Z-11	L 11118	22	1	41				4				21	<10	19	20900	138				<5	<1	16
57	Z-12	L 11119	14	1	34				7				12	<10	15	17200	106				<5	2	19
58d	Z-13	L 11120	17	1	42				7				18	<10	16	22500	127				<5	<1	13
59	Z-14	L 11121	21	1	50				8				25	6	20	25000	148				<5	2	19
60	Z-15	L 11122	22	<	44				16				22	7	23	21000	154				<5	1	21
		L																					
		L 11110 dup	~~30~~ 20	1	~~68~~ 46				19				10	~~40~~ 11	~~21~~ 5	~~37500~~ 23500	~~295~~ 165				<5	~~<1~~ 1	~~26~~ 16
		L 11120 dup	18	1	39				9				17	<10	17	20900	122				<5	<1	18
		L CC-1	88	2	39				81				951	<10	21	63200	83				<5	<1	25
		L																					

GEOL./PROJECT KC/Carmacks

16

ELEMENTS SIDE 1
Cu Pb Zn Au Ag Mo Sb Sn
W Hg As Co Ni Fe Mn B
Ba Be Bi Cd Ge

ELEMENTS SIDE 2
Cr Ge La Mg Sc So Te Th
Tl u v Y Zr
Other:

METHODS
1-AAS 4-XRF
2-E-SPEC 5-COLOR
3-ICP 6-ALT. LAB

BATCH NO. 8146
SAMPLE TYPE. G
DATE IN 5/26/83 DATE OUT 6/9/83 44
SHIPMENT NO./DATE _____

	FIELD NO.	LAB NO.	Cu	Pb	Zn	Au	Ag	Mo	Sb	Sn	W	Hg	As	Co	Ni	Fe	Mn	B	Ba	Be	Bi	Cd	Cr
61	Z-16	L 11123	22	13	48				5				37	<10	20	28600	146				<5	<1	24
62	Z-17	L 11124	23	10	55				26				55	<10	24	30400	166				<5	<1	22
63	Z-18	L 11125	18	11	55				14				42	<10	20	33400	161				<5	<1	26
64	Z-19	L 11126	20	10	47				10				27	<10	20	28500	152				<5	<1	23
65	Z-20	L 11127	23	10	55				14				45	<10	25	31300	193				<5	<1	26
66	Z-21	L 11128	23	9	54				13				32	<10	24	29600	179				<5	<1	24
67	Z-22	L 11129	16	10	42				7				21	<10	18	24500	136				<5	<1	22
68	Z-23	L 11130	22	9	43				3				24	<10	18	21300	131				<5	<1	20
69	Z-24	L 11131	18	11	39				<1				29	<10	18	25200	133				<5	<1	22
70	Z-25	L 11132	27	10	48				<1				30	<10	22	25500	180				<5	<1	22
71	Z-26	L 11133	21	10	44				<1				25	<10	21	27000	169				<5	<1	26
72	Z-27	L 11134	24	10	54				<1				48	<10	26	33300	179				<5	<1	28
73	Z-28	L 11135	25	10	57				<1				44	<10	28	33600	199				<5	<1	26
74	Z-29	L 11136	26	11	53				<1				39	<10	25	33700	197				<5	<1	24
75	Z-30	L 11137	25	12	45				<1				36	<10	19	24100	147				<5	<1	15
		L																					
		L 11130dup	20	9	43				2				21	<10	18	22800	132				<5	<1	16
		L																					
		L																					
		L																					

GEOL./PROJECT EG/21 Common

18

ELEMENTS SIDE 1
Cu Pb Zn Au Ag Mo Sb Sn
W Hg As Co Ni Fe Mn B
Ba Be Bi Cd Ce

ELEMENTS SIDE 2
Cr Ge La Mg Sc Sr Te Th
Tl U V Y Zr
Other:

METHODS
1-AAS 4-XRF
2-E-SPEC 5-COLOR
3-ICP 6-ALT. LAB

BATCH NO. 315/0
SAMPLE TYPE C
DATE IN 5/24/83 DATE OUT 6/14/83
SHIPMENT NO./DATE

	FIELD NO.	LAB NO.	Cu	Pb	Zn	Au	Ag	Mo	Sb	Sn	W	Hg	As	Co	Ni	Fe	Mn	B	Ba	Be	Bi	Cd	Cr
76	Z-31	L 11138	22	10	51				<1				29	<10	25	29200	174				<5	<1	28
77	Z-32	L 11139	39	13	72				5				51	11	34	36900	254				<5	<1	26
78	Z-33	L 11140	16	8	55				<1				10	<10	20	26500	164				<5	<1	24
79	Z-34	L 11141	18	9	44				<1				<10	<10	16	20700	136				<5	<1	18
80	Z-35	L 11142	23	8	60				<1				10	<10	22	27000	205				<5	<1	24
81	Z-36	L 11143	28	10	56				<1				<10	<10	21	27400	151				<5	<1	23
82	Z-37	L 11144	21	8	66				<1				<10	<10	22	30200	204				<5	<1	25
83	Z-38	L 11145	21	7	65				<1				<10	<10	21	25900	194				<5	<1	21
84	Z-39	L 11146	22	8	63				<1				<10	<10	23	29200	224				<5	<1	24
85	Z-40	L 11147	16	7	49				<1				<10	<10	18	22100	159				<5	<1	22
86	Z-41	L 11148	18	6	56				<1				<10	<10	20	26100	179				<5	<1	22
87	Z-42	L 11149	19	7	51				<1				18	<10	20	22100	266				<5	<1	17
88	Z-43	L 11150	22	10	64				<1				<10	<10	25	33700	230				<5	<1	31
89	Z-44	L 11151	18	7	57				<1				<10	<10	20	27000	214				<5	<1	24
90	Z-45	L 11152	17	7	47				<1				<10	<10	17	22200	391				<5	<1	20
		L																					
		L 11140 dup	16	8	55				<1				<10	<10	21	26100	162				<5	<1	26
		L 11150 dup	16	8	60				<1				<10	<10	18	31500	190				<5	<1	22
		L CC1	114	20	44				68				941	<10	18	94400	92				<5	<1	45
		L																					

GEOL./PROJECT KC/Oconee

6

ELEMENTS SIDE 1
Cu Pb Zn Au Ag Mo Sb Sn
W Hg As Co Ni Fe Mn B
Ba Be Bi Cd Cr

ELEMENTS SIDE 2
Ca Ge La Mg Se So Te Th
Ti U V Y Zr
Other:

METHODS
1-AAS 4-XRF
2-E-SPEC 5-COLOR
3-ICP 6-ALT. LAB

BATCH NO. 8160
SAMPLE TYPE E
DATE IN 6/20/83 DATE OUT 6/21/83
SHIPMENT NO./DATE ____

	FIELD NO.	LAB NO.	Cu	Pb	Zn	Au	Ag	Mo	Sb	Sn	W	Hg	As	Co	Ni	Fe	Mn	B	Ba	Be	Bi	Cd	Cr
91	2-46	L 11153	22	7	60				<1				10	<10	20	26900	275				<5	<1	21
92	2-47	L 11154	22	7	63				<1				<10	16	23	28500	568				<5	<1	23
93	2-48	L 11155	15	8	60				<1				<10	15	22	27900	546				<5	<1	30
94	2-49	L 11156	23	7	57				<1				<10	<10	22	27000	325				<5	<1	25
95	2-50	L 11157	22	7	67				<1				<10	<10	24	32400	219				<5	<1	30
		L																					
		L																					
		L																					
		L																					
		L																					
		L																					
		L																					
		L																					
		L																					
		L																					
		L 11157 dup	22	7	68				<1				<10	<10	22	32800	227				<5	<1	24
		L																					
		L																					
		L																					
		L																					

GEOL./PROJECT KC/Al Cominco

18

ELEMENTS SIDE 1
Cu Pb Zn Au Ag Mo Sb Sn
W Hg As Co Ni Fe Mn B
Ba Be Bi Cd Ca

ELEMENTS SIDE 2
Or Ge La Mg Sc Sr Te Th
Ti U V Y Zr
Other: 6/15/83

METHODS
1-AAS 4-XRF
2-E-SPEC B-COLOR
3-ICP 6-ALT. LAB

DATCH NO 87/80
SAMPLE TYPE E
DATE IN & DATE - OUT 6/8/83 6/15/83
SHIPMENT NO./DATE

	FIELD NO.	LAB NO.	Cu	Pb	Zn	Au	Ag	Mo	Sb	Sn	W	Hg	As	Co	Ni	Fe	Mn	B	Ba	Be	Bi	Cd	Ca
96	3 - 1	L 11158	33	8	55				<1				21	11	37	35500	267				<5	<1	37
97	3 - 2	L 11159	26	8	56				<1				<10	<10	28	35800	269				<5	<1	31
98	3 - 3	L 11160	20	5	48				<1				<10	<10	21	25200	246				<5	<1	22
99	3 - 4	L 11161	52	13	72				<1				106	13	38	47700	371				<5	<1	40
100	3 - 5	L 11162	28	10	49				<1				149	<10	20	30500	149				<5	<1	24
101	3 - 6	L 11163	18	10	43				<1				40	<10	17	27400	166				<5	<1	23
102	3 - 7	L 11164	15	9	36				<1				21	<10	16	20700	118				<5	<1	23
103	3 - 8	L 11165	21	8	55				<1				30	<10	23	34400	190				<5	<1	26
104	3 - 9	L 11166	25	9	62				15				58	<10	27	38100	293				<5	<1	27
105	3 - 10	L 11167	28	9	54				11				93	<10	22	31700	213				<5	<1	22
106	3 - 11	L 11168	26	8	58				15				122	<10	24	33800	202				<5	<1	25
107	3 - 12	L 11169	22	9	53				8				42	<10	21	28900	165				<5	<1	27
108	3 - 13	L 11170	27	9	56				11				33	<10	23	34500	230				<5	<1	26
109	3 - 14	L 11171	17	6	51				9				37	<10	19	31000	192				<5	<1	20
110	3 - 15	L 11172	24	7	61				<1				28	<10	28	37700	274				<5	<1	32
		L																					
		L 11160 dup	23	5	53				<1				<10	<10	24	29200	287				<5	<1	26
		L 11170 dup	23	8	52				10				34	<10	21	32100	215				<5	<1	25
		L CC1	84	21	36				69				1026	<10	19	68300	71				<5	<1	29
		L																					

GEOL./PROJECT KC/Colorado

16

ELEMENTS SIDE 1
Cu Pb Zn Au Ag Mo Sb Sn
W Hg As Co Ni Fe Mn B
Ba Se Bi Cd Ca

ELEMENTS SIDE 2
Cr Go La Mg So Sb Te Th
Ti U V Y Zr
Other:

METHODS
1-AAS 4-XRF
2-E-SPEC S-COLOR
3-ICP 6-ALT. LAO

BATCH NO. 880
SAMPLE TYPE S
DATE IN 5/6/93 DATE OUT 6/19/93
SHIPMENT NO./DATE

	FIELD NO.	LAB NO.	Cu	Pb	Zn	Au	Ag	Mo	Sb	Sn	W	Hg	As	Co	Ni	Fe	Mn	B	Ba	Be	Bi	Cd	Cr
111	3-16	L 11173	23	8	56				<1				17	<10	23	33100	191				<5	<1	26
112	3-17	L 11174	23	7	53				<1				21	<10	22	32800	201				<5	<1	23
113	3-18	L 11175	28	8	49				<1				18	<10	22	31000	141				<5	<1	24
114	3-19	L 11176	17	5	52				<1				<10	<10	21	32200	172				<5	<1	26
115	3-20	L 11177	17	7	54				<1				<10	<10	21	33200	168				<5	<1	27
116	3-21	L 11178	21	7	54				<1				<10	<10	21	31000	184				<5	<1	25
117	3-22	L 11179	18	7	49				<1				<10	<10	19	27520	163				<5	<1	24
118	3-23	L 11180	18	6	53				<1				<10	<10	20	33100	203				<5	<1	26
119	3-24	L 11181	14	7	46				<1				<10	<10	17	30500	132				<5	<1	21
120	3-25	L 11182	22	6	51				<1				<10	<10	18	27400	206				<5	<1	22
121	3-26	L 11183	20	4	62				<1				<10	<10	22	30100	213				<5	<1	25
122	3-27	L 11184	17	6	54				<1				<10	<10	21	34500	178				<5	<1	25
123	3-28	L 11185	20	6	59				<1				<10	<10	23	36000	190				<5	<1	30
124	3-29	L 11186	15	5	52				<1				<10	<10	18	30300	153				<5	<1	24
125	3-30	L 11187	25	5	46				<1				<10	<10	16	22800	131				<5	<1	19
		L																					
		L 11180dup	18	6	54				<1				<10	<10	20	33800	189				<5	<1	23
		L																					
		L																					
		L																					

GEOL./PROJECT

12

ELEMENTS SIDE 1
Cu Pb Zn Au Ag Mo Sb Sn
W Hg As Co Ni Fe Mn B
Ba Be Bi Cd Ca
6/7/93 AAS

ELEMENTS SIDE 2
Cr Ge La Mg Sc Se Te Th
Ti U V Y Zr
Other: 6/18/93 AAS

METHODS
1-AAS 4-XRF
2-E-SPEC 5-COLOR
3-ICP 6-ALT. LAB

BATCH NO. 89/0
SAMPLE TYPE E
DATE IN 6/6/93 DATE OUT 6/9/93 AA 6/18/93 ICP Au
SHIPMENT NO./DATE _____ ICP ppb

	FIELD NO.	LAB NO.	Cu	Pb	Zn	Au	Ag	Mo	Sb	Sn	W	Hg	As	Co	Ni	Fe	Mn	B	Ba	Be	Bi	Cd	Cr
126	3 - 31	L 111 88	18	9	49				<1				12	<10	19	29400	184				<5	<1	25
127	3 - 32	L 111 89	16	8	58				<1				<10	<10	22	35100	214				<5	<1	31
128	3 - 33	L 111 90	19	8	64				<1				<10	<10	26	39400	420				<5	<1	28
129	3 - 34	L 111 91	14	8	49				<1				<10	<10	17	27100	157				<5	<1	20
130	3 - 35	L 111 92	16	8	52				<1				<10	<10	19	29700	177				<5	<1	22
131	3 - 36	L 111 93	16	8	61				<1				<10	<10	21	32500	343				<5	<1	24
132	3 - 37	L 111 94	20	8	64				<1				<10	<10	23	32100	422				<5	<1	28
133	3 - 38	L 111 95	21	8	68				<1				14	<10	21	32300	142				<5	<1	28
134	3 - 39	L 111 96	5	7	<7				<1				<0	<0	18	27100	181				<5	<1	24
135	3 - 40	L 111 97	19	7	61				<1				<10	<10	20	29600	238				<5	<1	26
		L																					
		L																					
		L																					
		L																					
		L																					
		L 11190 dup	19	9	50				<1				<10	<10	18	26400	290				<5	<1	18
		L CC1	84	23	36				66				966	<10	20	69600	70				<5	<1	25
		L																					
		L																					
		L																					

GEOL./PROJECT EC/Vicuna

17

ELEMENTS SIDE 1
Cu Pb Zn Au Ag Mo Sb Sn
W Hg As Co Ni Fe Mn B
Be Bi Cd Ce

ELEMENTS SIDE 2
Ci Ge La Mg Sc Se To. Th
Ti u v Y Zr
Other:

METHODS
1-AAS 4-XRF
2-E-SPEC S-COLOR
3-ICP 6-ALT. LAB

BATCH NO. 8809
SAMPLE TYPE S
DATE IN 6/24/83 DATE OUT 6/9/83
SHIPMENT NO./DATE

	FIELD NO.	LAB NO.	Cu	Pb (met 6/7/83)	Zn	Au	Ag	Mo	Sb (met 6/7/83)	Sn	W	Hg	As (met 6/8/83)	Co	Ni	Fe	Mn	B	Ba	Be	Bi (dup)	Cd	Cr
136	4-1	L 11198	31	9	68				<1				<10	<10	25	40300	253				<5	<1	31
137	4-2	L 11199	27	12	56				<1				<10	14	22	34200	471				<5	<1	19
138	4-3	L 11200	30	10	58				<1				<10	<10	25	33800	181				<5	<1	30
139	4-4	L 11201	21	9	60				<1				<10	<10	24	34700	194				<5	<1	27
140	4-5	L 11202	16	9	52				2				<10	<10	18	28300	152				<5	<1	20
141	4-6	L 11203	28	11	57				5				30	11	23	35800	596				<5	<1	23
142	4-7	L 11204	28	10	47				3				36	<10	18	26300	161				<5	<1	22
143	4-8	L 11205	18	11	56				<1				31	<10	22	31900	173				<5	<1	24
144	4-9	L 11206	26	10	46				<1				<10	<10	16	24600	155				<5	<1	18
145	4-10	L 11207	23	9	57				<1				<10	<10	18	26100	218				<5	<1	23
146	4-11	L 11208	18	7	52				<1				<10	<10	19	25300	265				<5	<1	22
147	5-1	L 11209	24	9	60				<1				<10	<10	23	31800	332				<5	<1	25
148	5-2	L 11210	44	10	95				<1				<10	14	36	49800	535				<5	<1	41
149	5-3	L 11211	20	9	65				<1				<10	<10	21	31600	296				<5	<1	24
150	5-4	L 11212	22	11	63				<1				<10	<10	21	30100	439				<5	<1	17
		L																					
		L 11200dup	34	17	66				<1				<10	<10	27	35400	280				<5	<1	28
		L 11210dup	34	10	79				<				<10	10	26	35500	415				<5	<1	26
		L																					
		L																					

GEOL./PROJECT KC

16

Map No.

ELEMENTS SIDE 1
Cu Pb Zn Au Ag Mo Sb Sn
W Hg As Co Ni Fe Mn B
Ba Be Bi Cd Ce
6/7/83

ELEMENTS SIDE 2
Cr Ge La Mg Sc Se Te Th
Ti U V Y Zr
Other: 6/8/83

METHODS
1-AAS 4-XRF
2-E-SPEC 5-COLOR
3-ICP 6-ALT. LAB

BATCH NO. 821 10
SAMPLE TYPE #3
DATE IN 6/8/83 DATE OUT 6/8/83
SHIPMENT NO./DATE 6/8/83

	FIELD NO.	LAB NO.	Cu	Pb	Zn	Au	Ag	Mo	Sb	Sn	W	Hg	As	Co	Ni	Fe	Mn	B	Ba	Be	Bi	Cd	Ce
151	1	L112 13	23	13	62				<1				36	14	21	35400	494				<5	<1	15
152	2	L112 14	22	13	71				6				73	21	24	37800	847				<5	<1	13
153	3	L112 15	17	10	58				<1				25	<10	20	29800	210				<5	<1	15
154	4	L112 16	18	13	64				<1				34	13	21	34600	350				<5	<1	17
156	5	L112 17	28	11	72				<1				23	10	24	38100	343				<5	<1	23
157	6	L112 18	26	10	71				<1				<10	<10	22	31700	285				<5	<1	19
158	7	L112 19	34	15	70				<1				15	24	34	47700	923				<5	<1	22
160	8	L112 20	22	11	79				<1				13	17	26	47100	818				<5	<1	20
162	9	L112 21	21	9	68				<1				<10	<10	20	29400	249				<5	<1	18
163	10	L1122	20	10	61				<1				16	13	20	33200	553				<5	<1	17
164	11	L1123	21	10	61				<1				17	10	19	33000	454				<5	<1	15
165	12	L1124	17	7	60				<1				<10	<10	18	26200	296				<5	<1	14
167	13	L1125	16	10	63				<1				<10	<10	19	31200	582				<5	<1	13
168	14	L1126	20	10	63				<1				<10	<10	19	30300	228				<5	<1	15
		L																					
		L																					
		L1220dup	20	12	73				<1				<10	15	24	42800	745				<5	<1	16
		LSC1	93	21	45				66				917	<10	23	89500	80				<5	<1	25
		L																					
		L																					

GEOL./PROJECT EC/Coleman

6

ELEMENTS SIDE 1
Cu Pb Zn Au Ag Mo Sb Sn
W Hg As Co Ni Fe Mn B
Ba Be Bi Cd Ce
6/7/83

ELEMENTS SIDE 2
Cr Ge L a Mg Sc Se Te Th
Tl u v Y Zr
Other: 6/7/83 6/4/83

METHODS
1-AAS 4-XRF
2-E-SPEC 5-COLOR
3-ICP 1-ALT. LAB

BATCH NO. 8224-0
SAMPLE TYPE SP
DATE IN 5/26/83 DATE OUT 6/15/83
SHIPMENT NO./DATE ____

Map No.

	FIELD NO.	LAB NO.	Cu	Pb	Zn	Au	Ag	Mo	Sb	Sn	W	Hg	As	Co	Ni	Fe	Mn	B	Ba	Be	Bi	Cd	Cr
155	PC-1	L 11227	10	10	43				27				21	<10	12	22400	141				<5	<1	2
159	PC-2	L 11228	13	11	37				<1				<10	<10	15	23000	363				<5	<1	9
161	PC-3	L 11229	13	10	56				<1				11	12	18	37200	615				<5	<1	8
166	PC-4	L 11230	14	11	52				8				13	<10	16	34800	286				<5	<1	11
169	PC-5	L 11231	12	22	59				<1				<10	<10	16	34100	366				<5	<1	4
		L																					
		L																					
		L																					
		L																					
		L																					
		L																					
		L																					
		L																					
		L																					
		L																					
		L																					
		L 11230dup	12	10	47				13				12	<10	14	30400	257				<5	<1	12
		L																					
		L																					
		L																					

GEOL./PROJECT KC / D'Connell

6

ELEMENTS SIDE 1
Cu Pb Zn Au Ag Mo Sb Sn
W Hg As Co Ni Fe Mn B
Ba Be Bi Cd Cr

ELEMENTS SIDE 2
Cr Ga La Mg Sc Se Te Th
Ti U V Y Zr
Others

METHODS
1-AAS 4-XRF
2-E-SPEC 5-COLOR
3-ICP 6-ALT. LAB

BATCH NO. 8246
SAMPLE TYPE SED
DATE IN 7/26 DATE OUT 8/15/93
SHIPMENT NO./DATE

Map No.

FIELD NO.	LAB NO.	Cu	Pb	Zn	Au	Ag	Mo	Sb	Sn	W	Hg	As	Co	Ni	Fe	Mn	B	Ba	Be	Bi	Cd	Cr
155 PC-1	L 11227	10	10	42				27				21	<10	12	22400	141				<5	<1	2
159 PC-2	L 11228	13	11	37				<1				<10	<10	15	23000	363				<5	<1	9
161 PC-3	L 11229	13	10	56				<1				11	12	18	37200	615				<5	<1	8
166d PC-4	L 11250	14	11	52				8				13	<10	16	34800	286				<5	<1	11
169 PC-5	L 11231	12	22	59				<1				<10	<10	16	34100	366				<5	<1	4
	L																					
	L																					
	L																					
	L																					
	L																					
	L																					
	L																					
	L																					
	L																					
	L																					
	L																					
	L 11230dup	12	10	47				13				12	<10	14	30400	257				<5	<1	12
	L																					
	L																					
	L																					

GEOL./PROJECT KC / Alaska