Mt. Hayes (Quad) 68

FIELD REPORT ON TIN EXPLORATION IN THE BERRY CREEK DRAINAGE, EASTERN ALASKA RANGE.

by

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INTRODUCTION

The purpose of this investigation was to attempt to identify the bedrock source of anomalous tin, tungsten, silver and base metal stream sediment and pan concentrate anomalies in the Berry Creek drainage as reported by the USGS (1) in 1981. In this field examination the cirque at the head of Berry Creek was targeted as potentially containing a significant lode tin deposit due to the occurrence of one stream sediment sample registering high trace element concentrations at the foot of the cirque.

During the time period of August 21-25, 1989 Roger Burleigh, Geologist AFOC - Fairbanks, and Vic Fisher, Temporary Geologist AFOC -Fairbanks carried out a field examination of the rocks at the headwaters of Berry Creek to ascertain the source of the geochemical anomalies identified by the USGS (1).

LOCATION AND ACCESS

The target area is located in sections 9, 10, 11, 14, 15, 16, 22, and 23 of township 16 south, range 16 east of the Fairbanks meridean (fig. 1). A campsite on the edge of a tarn lake in section 10 was chosen for its proximity to a false-color airphoto indicated gossany stained linear zone. Access to the campsite was accomplished by a 30 minute helicopter ride out of Tanacross. The plateau-like areas near the target area may be suitable for the landing of a tundra-tired super cub but were not investigated.

PHYSIOGRAPHY

The target area is situated at the headwaters of Berry Creek where receding alpine glaciers and their associated moraines partially blanket rugged mountainous terrain. At the foot of the cirque, thick accumulations of glacial till are currently being eroded into Berry Creek (fig. 1). The base of the moraine lies in Berry Creek at an elevation of 4400 feet with peaks at the rim of the cirque rising to 7300 feet. Strong south winds were experienced during the field examination which produced gusts up to an estimated 50 miles per hour. Since this portion of the Alaska Range is located on the leeward side, the prevailing winds generally carry little moisture and precipitation was not a problem.

GEOLOGY

The headwaters of Berry Creek are underlain by monzonite and quartz monzonite plutonic rocks which are cut by lamprophyre and leucocratic rhyolite dikes. Small iron-stained roof pendants and slivers of biotite-amphibolite grade gneiss and migmatitic schist and quartzite are distributed throughout the pluton.

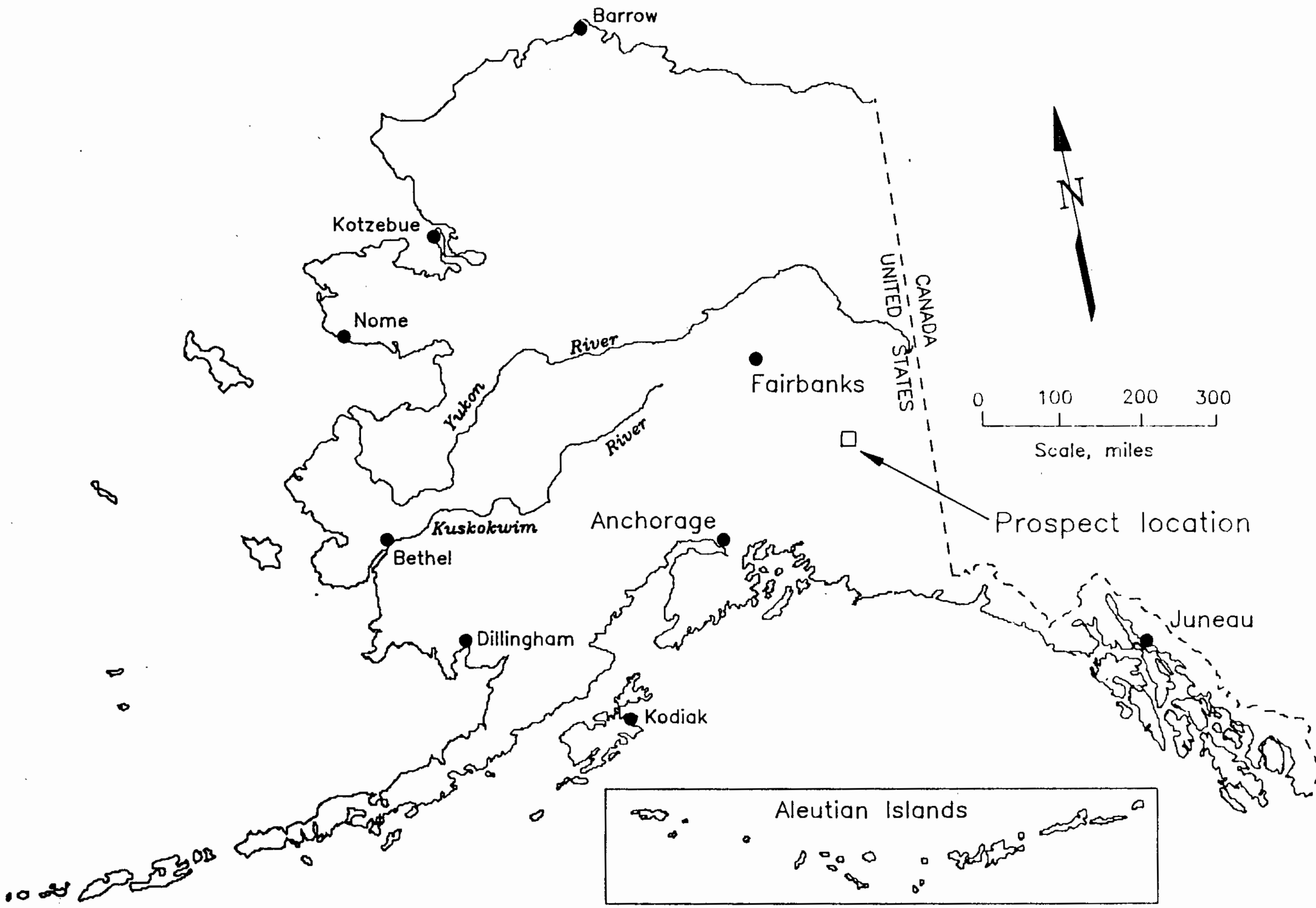

Figure I. Prospect location map.

Plutonic Rocks

The pluton is largely a coarse-grained hypidiomorphic quartz monzonite that exhibits porphyritic textures to a some degree. Mafic mineralogy generally consists of coarse grained biotite and amphibole. A finer-grained, more leucocratic monzonite (?) phase is present and appears to cut the coarse-grained quartz monzonite phase.

Dike Rocks

Two types of dike rocks cut the quartz monzonite pluton. These include leucocratic, fine-grained, equigranular quartz-feldspar aplite dikes and biotite-rich lamprophyre dikes. The aplite dikes are easily distinquished from the quartz monzonite pluton by their iron-oxide stained weathering characteristics. The lamprophyre dikes, while thin, stand out from the pluton as narrow black ribbons across cirque walls.

MINERALIZATION

The aplite dikes are generally altered. This alteration is most apparant in the formation of coarse grains of cubic euhedral pyrite and formation of clays and white mica at the expense of pink potassium feldspar. Rarely do these dikes occur in an unaltered state. The pyrite occurs along fractures and as disseminations with grains forming cubes up to .75 cm in diameter. At one location, sample Ak 27550 (fig. 2), a soft black resinous mineral with multiple cleavage faces occurs in association with pyrite. This mineral was not identified but the rock does contain weakly elevated tin values of 34 ppm. In comparison, intensely altered dikes (clay and white mica alteration) contain up to 180 ppm Sn.

The glacial till contained rare boulders of aplite dike rock (sample KS-27552) which are crosscut by coarse grained muscovite-quartz veinlets. These veinlets are bordered by the greenish gray muscovite and contain minor wolframite; very similar to those found at Sleitat Mtn. in southwest Alaska. This high-graded sample contained anomalous Sn (235 ppm) and W (921 ppm). Near the location of this float sample one cobble of coarse grained, massive arsenopyrite was found and sampled (KS-27553, fig. 2). Arsenopyrite is usually associated with significant tin mineralization in the Alaska Range (eg. Ohio Creek and Coal Creek tin deposits) and in southwest Alaska (Sleitat Mountain), hence, finding these two samples in such close proximity to one another in the glacial till may be more than fortuitous. This arsenic-rich sample also exhibits anomalous Sn (480 ppm), and additionally, anomalous Au (5.98 ppm).

Aside from the pyritic aplite dikes, several examples of narrow base metal-rich veins cutting quartz monzonite boulders were found in the glacial moraines within sections

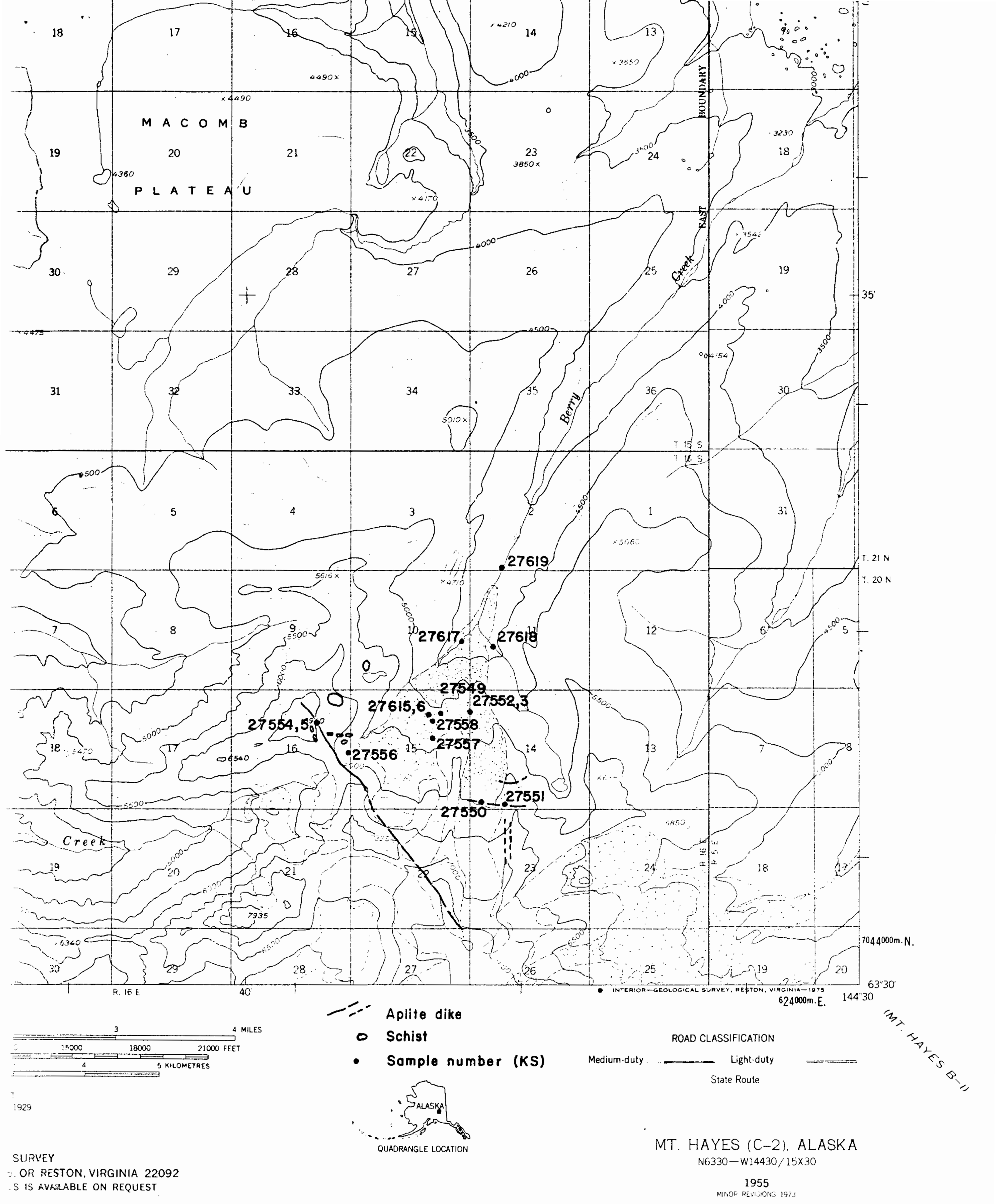

Figure 2. Sample location map.

14 and 15 (fig. 2). The most abundant and highly mineralized rocks were found west of the north-south trending ridge in the moraines located in the northeast corner of section 15, figure 2. The analyses for precious metals and significant base metals is presented in table 1 with the corresponding, less significant trace element analyses, listed in appendix A.

Specimens of base metal-rich veins contained a wide variety of ore minerals. Pyrite, sphalerite, galena, arsenopyrite, chalcopyrite, and possibly scheelite are found in varying concentrations in association with quartz - flourite - carbonate gangue minerals. The proportions of sulfide minerals varied significantly between the samples collected, and all of the mineralization found occurs in narrow, .5 to 8 inch, chlorite altered fracture zones in the boulders of quartz monzonite till. There were no indications from the glacial debris that concentrations of these veins were to be expected in the bedrock source.

Table 1. - INAA trace element analysis of mineralized rocks.

Sample Number	Au ppb	Ag ppm	As ppm	Cd ppm	Pb ppm	Sb ppm
Ak-27549	<44	130	26600	1030	2365	20.0
27550	1590	<5	84	<10	208	5.8
27551	<5	<5	79	<10	51	4.3
27552	8	22	247	<10	112	30.4
27553	5980	74	>30000	<71	280	29.2
27554	8	<5	533	<10	39	4.7
27555	22	<5	651	<10	63	2.3
27556	<5	<5	17	<10	28	1.1
27557	140	16	6380	19	1.82 %	66.0
27558	<5	8	97	130	820	18.0
27615	<5	<5	55	<10	98	7.9
27616	<5	9	541	55	2317	10.0

Sample Number	Sn ppm	W ppm	Zn ppm	Description
Ak-27549	5300	78	8.2 %	4" sp,as,cp,ga,py vein
27550	21	6	270	aplite w/ qtz veins
27551	34	5	<200	aplite w/ diss. pyrite
27552	235	921	<200	aplite w/ qtz-mus-wf vein
27553	480	<49	550	massive arsenopyrite
27554	180	9	<200	altered aplite dike
27555	64	5	<200	weakly altered aplite
27556	6	4	<200	altered qtz monzonite
27557	1500	515	540	3" py,ga,as,fl,qtz vein
27558	315	12	16000	2.5" sph,qtz,fl vein
27615	190	20	<200	altered qtz monz. w/py
27616	795	44	4800	diss. cpy,ga,py,sph

Flourite was observed as small pinkish-purple grains disseminated in quartz - carbonate veins in rare fragments of dacite (?) found in the glacial till and as more massive (up to 1.5 cm) pale blue grains, or lenses, in base metal-rich veins. The quartz varied from cryptocrystalline selvages to coarse cockscomb quartz and the carbonate generally filled interstices in the quartz veining.

The base metal-rich veins are associated with narrow shears in the quartz monzonite. Alteration of the wall rock resulted in the destruction of the feldspars and the formation of compact chlorite, quartz, and probably carbonate and white mica. The biotite and amphibole are largely altered to chlorite and possibly white mica. The anhedral grains of quartz in the quartz monzonite appear to have been uneffected by the hydrothermal fluids.

Base metal mineralization is in the form of sulfide-rich veinlets and as disseminations. The disseminated mineralization contains approximately 1% of combined sphalerite, galena and lesser pyrite. This style of mineralization, as found in cobbles of the glacial debris, may actually be related to more vein-like mineralization that is no longer attached to the altered wall rock.

PAN CONCENTRATE SURVEY

Three pan concentrate samples were collected in an effort to qualitatively compare the distribution of observed mineralization to its reflection in the stream sediment record. Significant concentrations of black sands were not noted in any of the pans. The sample volume in each case was a level 14 in pan of -1/2 inch material sized from an original volume of 1 1/4 to 2.5 level 14" grizzly sieves.

A scan, with both long and short wave ultraviolet light tentatively identified minor scheelite and moderate amounts of a fine grained mineral that floureces bright orange. The latter mineral is probably zircon. Table two lists the analyses for the significant trace elements, while other trace element analyses are listed in appendix B.

Table 2. - Trace element analyses of pan concentrate samples.

Sample Number	Au ppb	Ag ppm	As ppm	Pb ppm	Sb ppm
Ak 27617	35	<5	100	192	5.6
Ak 27618	110	<5	33	21	9.4
Ak 27619	310	<5	90	143	6.1

Sample Number	Sn ppm	W ppm	Zn ppm
Ak 27617	340	180	<200
Ak 27618	61	30	<200
Ak 27619	3000	356	<200

Locations of panned concentrate samples in table 2 are plotted on figure 1. Lead and tin appear to exhibit anomalous values, however, without a larger data base anomalies may only be perceived and not real. Galena mineralization is prevalent in the rocks forming the glacial till upstream of these samples so the elevated lead values are not surprising. The lack of significant zinc in the pan concentrates is curious given the levels of zinc mineralization found in samples of glacial till.

SUMMARY AND RECOMMENDATIONS

The mineralization observed in the headwaters of Berry Creek is hosted by two igneous rock types, 1) a coarse-grained quartz monzonite and 2) aplite dikes. Insufficient data exists to indicate whether either of these rock types host a specific type of mineralization at the exclusion of the others observed. The examples of mineralization observed in the glacial till indicate that the veins constitute narrow fissures filled with base-metal mineralization which one might encounter distal to a significant tin-greisen system. These veins are very similar, both in mineralogy and morphology, to base metal veins encountered in the Little Underhill Creek area of the Tired Pup pluton of southwest Alaska.

Further work in the Berry Creek drainage is not recommended due to the sparse nature, and small size of the vein mineralization encountered.

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APPENDIX A: INAA TRACE ELEMENT ANALYSIS OF MINERALIZED ROCKS.

SAMPLE NUMBERS	Ba ppm	Br ppm	Ce ppm	Co ppm	Cr ppm	Cs ppm	Eu ppm	Fe pct	Hf ppm	Ir ppb	La ppm	Lu ppm	Mo ppm
AK 27549	<440	59	<87	<10	<240	28	<2	8.9	<8	<320	26	<1.3	<9
27550	250	<1	39	<10	130	23	<2	1.0	4	<100	13	<0.5	<2
27551	<100	<1	34	<10	160	7	<2	0.9	5	<100	11	<0.5	<2
27552	110	<1	<10	<10	240	10	<2	1.5	<2	<100	8	<0.5	4
27553	<300	<201	<49	36	<140	43	4	18.0	<5	<100	12	<1.0	<12
27554	160	<1	43	<10	140	28	<2	<0.5	<2	<100	12	<0.5	<2
27555	<100	2	78	<10	140	24	<2	0.8	4	<100	18	<0.5	<2
27556	1000	<1	63	<10	82	5	<2	1.2	3	<100	33	<0.5	<2
27557	440	19	30	<10	200	93	<2	2.7	<2	<100	18	<0.5	<2
27558	510	<1	42	<10	230	71	<2	2.8	<2	<100	21	<0.5	<2
27615	<100	<1	46	<10	130	16	<2	0.5	4	<100	12	<0.5	<2
27616	650	1	64	<10	210	63	<2	2.8	<2	<100	33	<0.5	<2

SAMPLE NUMBERS	Na pct	Ni ppm	Rb ppm	Sc ppm	Se ppm	Sm ppm	Ta ppm	Tb ppm	Te ppm	Th ppm	U ppm	Yb ppm	Zr ppm
AK 27549	0.05	<97	540	2.5	<56	4.4	<1	<1	<160	6.8	<2.2	<47	<2100
27550	1.40	<50	400	1.3	<10	6.2	3	2	<20	28.0	19.0	5	<500
27551	2.10	<50	330	1.0	<10	4.9	4	1	<20	29.0	15.0	5	<500
27552	1.60	<50	410	1.2	<10	2.4	3	<1	<20	30.0	7.2	<5	<500
27553	<1.30	<90	520	2.9	<30	2.5	<1	<1	<120	7.1	<3.3	<42	<1200
27554	0.09	<50	1200	0.8	<10	6.9	29	2	<20	16.0	9.5	12	<500
27555	1.50	<50	1040	0.8	<10	14.0	12	4	<20	40.0	25.0	18	<500
27556	2.90	<50	230	5.7	<10	4.6	<1	<1	<20	27.0	5.8	<5	<500
27557	0.08	<50	1130	4.5	<10	2.5	<1	<1	<20	8.3	23.0	9	<500
27558	0.05	<50	1220	3.9	<10	2.8	2	<1	<20	12.0	5.5	<5	<500
27615	3.20	<50	760	<0.5	<10	7.3	30	2	<20	17.0	19.0	10	<500
27616	0.19	<50	1260	5.0	<10	3.8	1	<1	<20	17.0	36.0	<5	<500

APPENDIX B - Trace element analysis of pan concentrate samples.

Sample Number	Ba ppm	Br ppm	Cd ppm	Ce ppm	Co ppm	Cr ppm
Ak 27617	660	<1	<10	300	<10	130
Ak 27618	690	<1	<10	140	<10	<50
Ak 27619	370	<1	<10	320	11	98

Sample Number	Cs ppm	Eu ppm	Fe pct	Hf ppm	Ir ppb	La ppm
Ak 27617	10	<2	4.0	71	<100	180
Ak 27618	6	<2	3.5	59	<100	79
Ak 27619	8	<2	3.4	120	<100	180

Sample Number	Lu ppm	Mo ppm	Na pct	Ni ppm	Rb ppm	Sc ppm
Ak 27617	<.5	<2	1.6	<50	160	12.0
Ak 27618	<.5	<2	1.7	<50	170	9.4
Ak 27619	<.5	<2	1.7	<50	180	14.0

Sample Number	Se ppm	Sm ppm	Ta ppm	Tb ppm	Te ppm	Th ppm
Ak 27617	<10	19.0	5	2	<20	143
Ak 27618	<10	9.0	4	2	<20	115
Ak 27619	<10	19.0	5	3	<20	160

Sample Number	U ppm	Yb ppm	Zr ppm
Ak 27617	58.0	8	3300
Ak 27618	38.0	5	2900
Ak 27619	80.4	12	6000