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PRELIMINARY REPORT ON GALENA LEAD ISOTOPE DATA FROM THE HYDER AREA, SOUTHEAST ALASKA

by

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INTRODUCTION

This study is part of a cooperative agreement number C0101019 between the U.S. Bureau of Mines and the Alaska Division of Geological and Geophysical Surveys to investigate the geology and mineralization of the Ketchikan Mining District.

This preliminary report lists the results of 27 galena lead isotope analyses from mineralized samples collected throughout the Hyder Area in Southeast Alaska during the 1992 field season. In addition, four lead isotope analyses previously reported by Solie and others (1991) from the area are also included.

Lead isotopes from the Stewart Mining Camp, British Columbia, adjacent to the Hyder district, were found by Alldrick and others (1987) to cluster into two major groups that appear to define two distinct ore-forming episodes: 1) a Jurassic event associated with the Texas Creek plutonic suite and cogenetic calc-alkaline Hazelton Group volcanic rocks of the Stikinia terrane about 190 million years ago, and 2) epigenetic veins associated with subduction generated Eocene plutons of the Coast Plutonic complex. The Canadian field and laboratory studies indicate characteristic mineral assemblages for each event: Early Jurassic gold-silver-base metals and Tertiary silver-lead-zinc $\pm$ molybdenum (Alldrick and others, 1990). Subsequent analysis of lead isotopes from the Stewart-Iskut area by Godwin and others (1990) further substantiated and expanded on Alldricks's work. Historically the precious-metal rich Jurassic event has been of greater economic significance, hence the Canadians suggest galena lead isotope analysis as a simple and effective way to establish relative deposit age and set exploration priorities in the Stewart Mining Camp. Sampling begun by Solie and others (1991) and the present study are efforts to carry the lead isotope data base across the border into Alaska in this highly mineralized region.

ANALYTICAL METHODS

Samples were analyzed by Richard Hurst of Chempet Research Corporation, 330 N. Zachary Avenue, Suite 107, Moorpark, California 93021. Their analytical method: 1-3 mg of sample were extracted using 6.2 N HCL + 8N HNO3 (4:1 ratio). Lead was separated using anion exchange chromatography (HBr and HCl methods). Lead isotopic compositions were measured on a 30 cm radius, 90 degree sector TIMS. Isotopic fractionation ranged from 0.040 to 0.081% per atomic mass unit during the course of this study as measured relative to NBS SRM 981 lead (R. Hurst, written communication, 1992).

RESULTS AND DISCUSSION

Results, sample descriptions and locations are listed in tables 1 and 2. Lead-lead ratios are plotted in figures 1 through 3. Also show on these figures are the Jurassic and Tertiary lead isotope fields defined by nearly 200 analyses listed by Godwin and others (1990) from the Stewart-Iskut area as well as the Jurassic and Tertiary mean values (designated J and T). Although a more detailed analysis of the data will be addressed in a final report on the Ketchikan Mining District, several initial observations can be made at this point.

--Most Hyder area samples roughly plot in either of the two groups, although they do not cluster as tightly as the Canadian samples.

--The majority of samples plot in the vicinity of the Canadians' Tertiary-aged samples, particularly in Figure 3, which minimizes 204Pb error by plotting 206Pb/208Pb vs 206Pb/207Pb.

--Samples from the Double Anchor(l) and nearby Chickamin glacier area(z) show the closest affinity to the Canadians' Jurassic mean. The Cantu(o) and possibly the Grey Copper(c) and Iron Cap(i) may also be attributed to this event.

--While one sample from the Double Anchor(l) plots near the Jurassic mean, two other samples from the area (k and C) appear to be Eocene, suggesting mineralization from both events is present at the prospect.

--Both metallogenic epochs may also be present at the Mountain View mine. The sample from the Grey Copper vein(c), collected 2500 ft inside the Mountain View mine suggests the older event, while a sample collected from the mine dump outside the adit(D) appears to be Tertiary. Although neither sample falls strictly within the Tertiary and Jurassic fields defined by the Canadians. Sample D is suspect because it was not collected in place and 204Pb results are erratic. (Sample c-Grey Copper will be reanalyzed this spring.)

--One sample from the Daly Creek area (zz) plots so far to the right that it could not be included at the scale of the figures.

ACKNOWLEDGMENTS

We gratefully acknowledge the lead isotope work begun in Hyder by Diana Solie and Wyatt Gilbert in 1990. Rainer Newberry offered thoughtful comments. Samples were contributed by Peter Bittenbender, Mitch McDonald, and Jim Bertolucci of the U.S. Bureau of Mines. John Roe provided digital cartography.

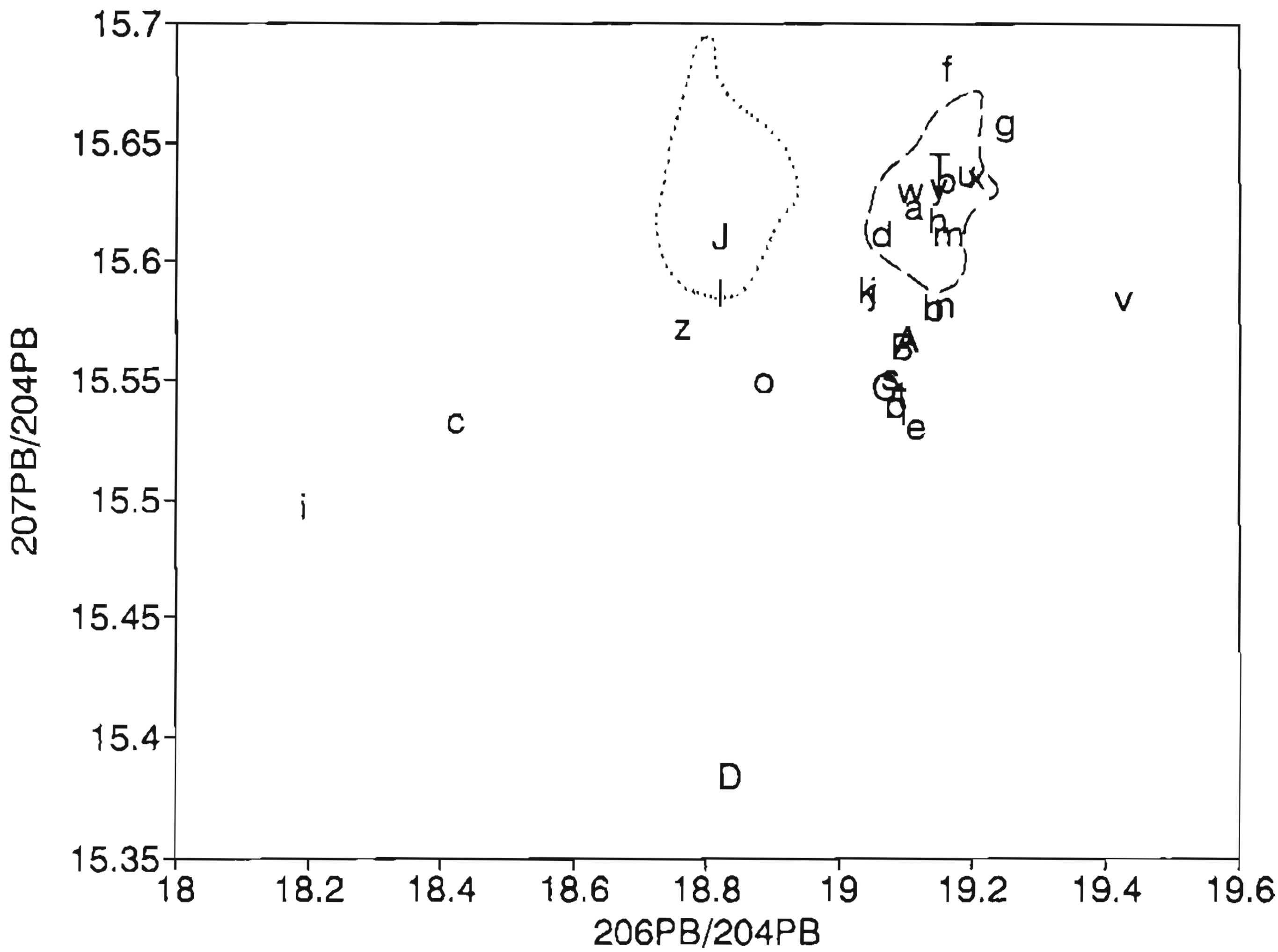

Figure 1. 207Pb/204Pb vs 206Pb/204Pb from mineral deposits in the Hyder area showing fields of Early Jurassic (gold-silver and base metal) deposits and Tertiary (silver-lead-zinc ± molybdenum) deposits in the Stewart-Iskut area, British Columbia (Godwin and others, 1991). Dotted field is Jurassic, dashed field is Tertiary.

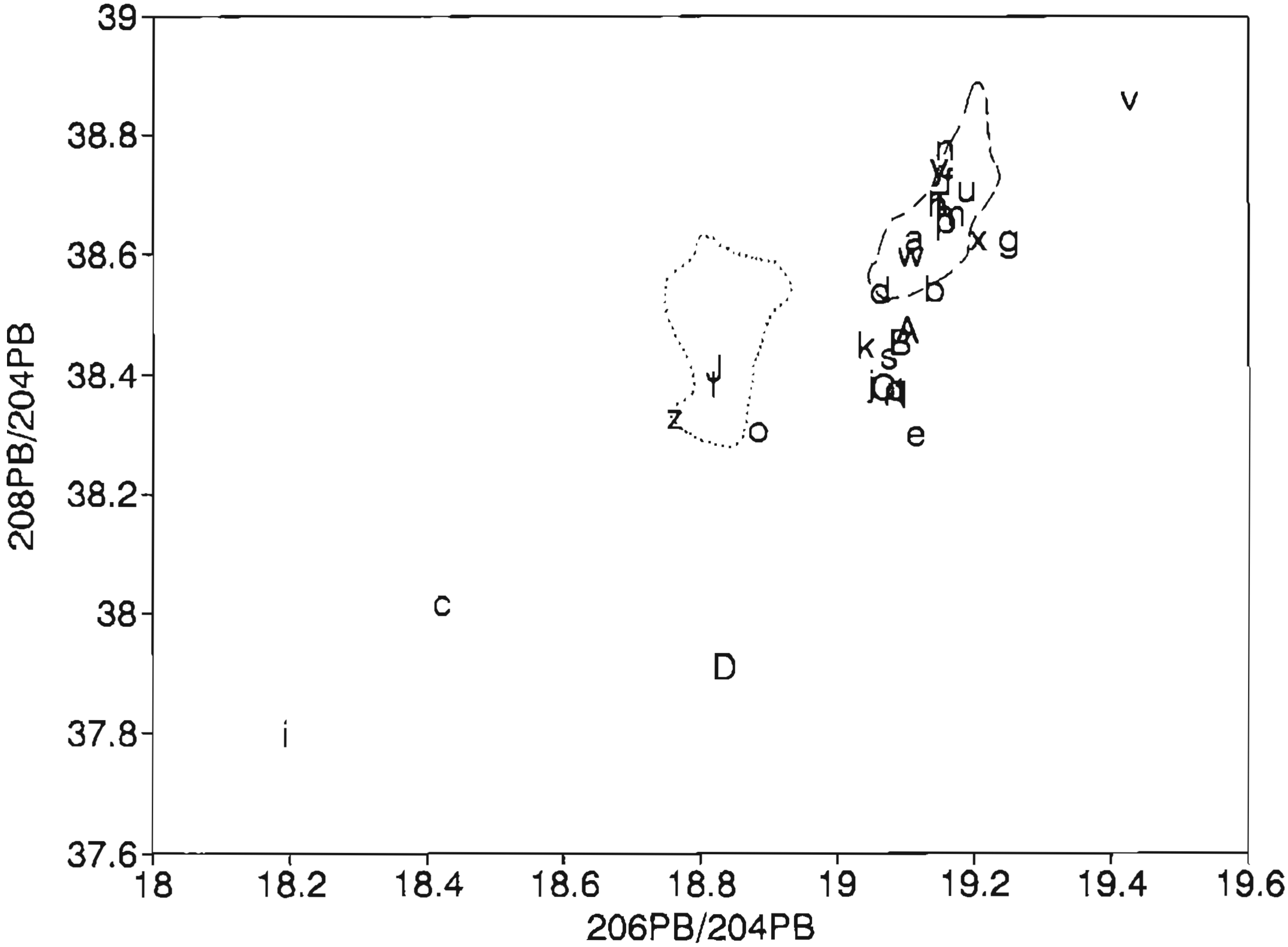

Figure 2. 208Pb/204Pb vs 206Pb/204Pb from mineral deposits in the Hyder area showing fields of Early Jurassic (gold-silver and base metal) deposits and Tertiary (silver-lead-zinc $\pm$ molybdenum) deposits in Stewart-Iskut area, British Columbia (Godwin and others, 1991). Dotted field is Jurassic, dashed field is Tertiary.

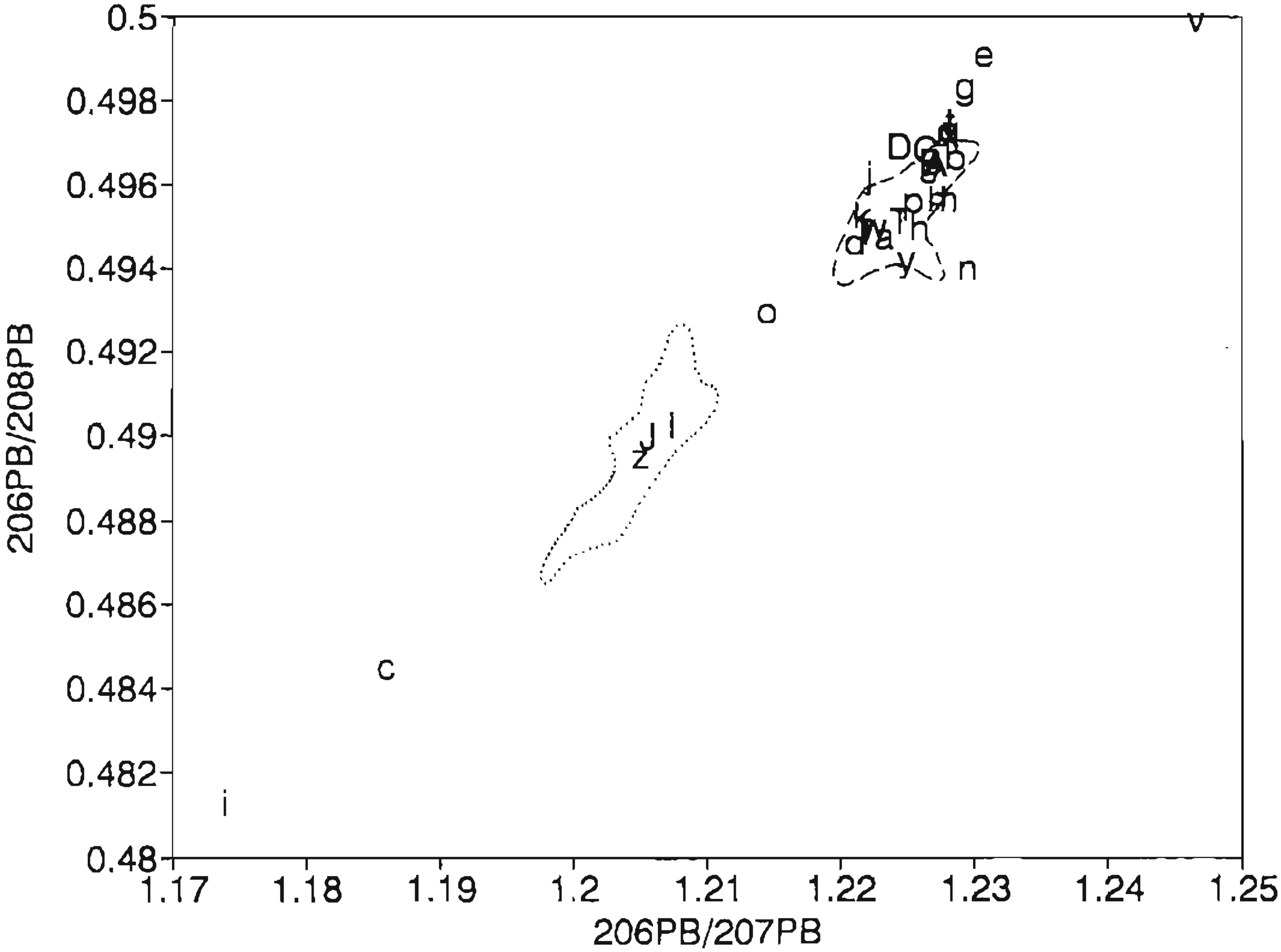

Figure 3. 206Pb/208Pb vs 206Pb/207Pb from mineral deposits in the Hyder area showing fields of Early Jurassic (gold-silver and base metal) deposits and Tertiary (silver-lead-zinc ± molybdenum) deposits in Stewart-Iskut area, British Columbia (Godwin and others, 1991). Dotted field is Jurassic, dashed field is Tertiary.

Table 1. GALENA LEAD ISOTOPE DATA, HYDER AREA, ALASKA

	PROSPECT NAME	SAMPLE	Pb CONTENT	206Pb/204Pb	207Pb/204Pb	208Pb/204Pb	206Pb/207Pb	206Pb/208Pb
a	Stoner	5497x	7306 ppm	19.111 (3)	15.623 (2)	38.626 (10)	1.2233	0.4948
b	Riverside	1	gray sulfides	19.141 (10)	15.580 (6)	38.541 (22)	1.2286	0.4966
c	Grey Copper	6505	>10,000 ppm	18.421 (4)	15.533 (6)	38.018 (4)	1.1859	0.4845
d	Daly-Alaska	6606x	gray sulfides	19.063 (13)	15.611 (9)	38.540 (20)	1.2211	0.4946
e	Ronan Dump	2	vis galena	19.115 (11)	15.531 (10)	38.301 (22)	1.2308	0.4991
f	Silver Point	6582x	2.03%	19.161 (4)	15.681 (5)	38.720 (14)	1.2219	0.4949
g	Homestake	3	vis galena	19.249 (4)	15.659 (4)	38.627 (6)	1.2293	0.4983
h	Solo East (trench)	4	vis galena	19.146 (9)	15.617 (12)	38.681 (21)	1.2260	0.4950
i	Iron Cap	6691x	1620 ppm	18.192 (13)	15.497 (10)	37.799 (24)	1.1739	0.4813
j	Eureka	6704	1780 ppm	19.048 (9)	15.587 (8)	38.385 (23)	1.2220	0.4962
k	Double Anchor	6122x	>10,000 ppm	19.041 (3)	15.587 (3)	38.448 (10)	1.2216	0.4952
l	Double Anchor	6740x	3890 ppm	18.818 (10)	15.586 (10)	38.383 (9)	1.2074	0.4903
m	Engineer	8193	21.48%	19.165 (10)	15.611 (9)	38.666 (26)	1.2277	0.4957
n	Engineer (duplicate)	DUP8193		19.157 (6)	15.581 (10)	38.778 (20)	1.2295	0.4940
o	Cantu	8217	27.2%	18.885 (7)	15.550 (6)	38.309 (15)	1.2145	0.4930
p	Joe-Joe	8255	5.57%	19.158 (7)	15.634 (6)	38.655 (12)	1.2254	0.4956
q	Lower Marmot Basin	8269	6.11%	19.085 (9)	15.540 (10)	38.378 (21)	1.2281	0.4973
r	Upper Marmot Basin	8296	3.25%	19.076 (18)	15.540 (16)	38.368 (29)	1.2275	0.4972
s	Heckla	8507	8.41%	19.075 (4)	15.551 (6)	38.430 (31)	1.2266	0.4964
t	Swennings Greenpoint	8552	2.04%	19.092 (6)	15.544 (9)	38.374 (19)	1.2283	0.4975
u	Ibex	6622x	>10,000 ppm	19.190 (1)	15.637 (2)	38.707 (1)	1.2272	0.4958
v	Lakeside	6730x	>10,000 ppm	19.427 (4)	15.584 (7)	38.862 (21)	1.2466	0.4999
w	Mt. Dolly	6743x	>10,000 ppm	19.107 (10)	15.630 (10)	38.600 (13)	1.2225	0.4950
x	Silver Coin	5	vis galena	19.205 (10)	15.636 (9)	38.627 (16)	1.2283	0.4972
y	Blashier	6	vis galena	19.149 (1)	15.632 (3)	38.746 (9)	1.2250	0.4942
z	Chickamin glacier area	92KC352	vis galena	18.763 (3)	15.572 (2)	38.330 (8)	1.2049	0.4895
zz	Daly Creek area	92KC337	vis galena	20.040 (6)	15.636 (5)	38.485 (15)	1.2817	0.5207
A	Riverside	*90DNS111	vis galena	19.102 (22)	15.567 (16)	38.474 (43)	1.2271	0.4965
B	Joe-Joe	*90DNS124	vis galena	19.093 (4)	15.564 (3)	38.453 (6)	1.2267	0.4965
C	Double Anchor	*90DNS128	vis galena	19.066 (10)	15.547 (9)	38.377 (13)	1.2263	0.4968
D	Mountain View Mine	*90WG219E	vis galena	18.836 (6)	15.384 (7)	37.908 (12)	1.2244	0.4969
J		**Avg-Jurassic		18.82	15.61	38.41	1.2056	0.4900
T		**Avg-Tertiary		19.15	15.64	38.68	1.2244	0.4951

Analyses by Richard Hurst, Chempet Research Corporation, 330 N. Zachary Ave., Suite 107, Moorpark, CA 93021

Errors are quoted at the 2 sigma standard error of the mean and occur in the last decimal place(s), e.g. 19.100(10) = 19.100 +/- 0.010.

* Samples analysed by Chempet Research Corp. (Solie and others, 1991)

** Jurassic and Tertiary deposit average from nearby Stewart-Iskut area, British Columbia (Godwin and others, 1991)

Table 2. SAMPLE LOCATION AND DESCRIPTION

	SAMPLE	LONG (W)	LAT (N)	PROSPECT	BRIEF SAMPLE DESCRIPTION*
a	5497x	130.029	56.036	Stoner	Sil gs w/ aspy, py, sl, gn. Hosted in silicified andesite.
b	1	130.071	56.003	Riverside	Qz vein w/ py, sl, gn, cp. Hosted in Texas Creek granodiorite.
c	6505	130.050	55.990	Grey Copper	Qz vein w/ py, gn,sl,cp. Hosted in Texas Creek granodiorite.
d	6606x	130.036	56.029	Daly Alaska	Sil gs w/ py, sl, gn, cp. Hosted in Hazelton volcanics.
e	2	130.051	56.003	Ronan Dump	Qz vein w/ py, sl, gn, cp. Hosted in Texas Creek granodiorite.
f	6582x	130.045	55.996	Silver Point	Qz vein w/ gn, sl, cp, py, tetrahedrite. Hosted in silicified andesite.
g	3	130.169	56.076	Homestake	Qz vein w/ gn, cp, sl, tetrahedrite. Hosted in Texas Creek granodiorite.
h	4	130.255	56.074	Solo East (trench)	Qz vein w/ gn, sl, cp, tetrahedrite, aspy. Hosted in argillite.
i	6691x	130.209	56.080	Iron Cap	Silicified qz, chert zone with po, py, sl, gn, cp. Hosted in hornfels.
j	6704	130.049	56.020	Eureka	Sulfide band w/ py, sl, gn, cp, aspy. Hosted in sheared silicified andesite.
k	6122x	130.246	56.065	Double Anchor	Qz zone w/ py, sl, gn, aspy. Hosted in argillite.
l	6740x	130.265	56.064	Double Anchor	Qz zone w/ py, sl, gn. Hosted in argillite.
m	8193	130.215	56.042	Engineer	Qz w/ py, gn. Hosted in Texas Creek granodiorite and Hazelton volcanics.
n	DUP8193	130.215	56.042	Engineer	Duplicate sample
o	8217	130.066	56.074	Cantu	Qz vein w/ msv sulf, gn, sl, cp, barite, tetrahedrite. Hosted in Hazelton volcanics.
p	8255	130.250	56.039	Joe-Joe	Qz vein w/ gn, cp, py. Hosted in Hazelton volcanics.
q	8269	130.355	56.018	Lower Marmot Basin	Qz vein w/ gn, sl, cp. Hosted in massive and banded hornfels.
r	8296	130.365	56.026	Upper Marmot Basin	Qz calcite vein w/ gn, mo. Hosted in massive and banded hornfels.
s	8507	130.325	56.012	Heckla	Qz vein w/ cp, gn, sl, py. Hosted in meta-sediments.
t	8552	130.257	56.016	Swennings Greenpoint	Qz vein w/ gn. Hosted in metasediments.
u	6622x	130.182	56.076	Ibex	Qz vein w/ gn, sl, cp, aspy. Hosted in Hazelton argillite.
v	6730x	130.268	56.053	Lakeside	Qz vein w/ py, cp, sl, gn, tetrahedrite.
w	6743X	130.008	55.973	Mt Dolly	Hornfelsed argillite w/ sulfide lens w/ sl, gn, cp, aspy, tetrahedrite.
x	5	130.171	56.079	Silver Coin	Qz lens w/ cp, gn. Hosted in Texas Creek granodiorite.
y	6	130.265	56.055	Blashier	Qz vein w/ cp, gn, sl, po. Hosted in hornfels.
z	92KC352	130.313	56.081	Chickamin glacier area	Gray, sil, crystal lapilli tuff w/ finely dissem py, gn.
zz	92KC337	130.035	56.028	Daly Creek area	Qz vein w/ msv py, gn at contact between black argillite and sil qt.
A	90DNS111	130.072	56.004	Riverside	Qz vein w/ gn, cp, py, sl(?) in dark green-gray porph intrusive.
B	90DNS124	130.250	56.039	Joe-Joe	Qz vein w/ py, gn in tuffs. Gn is post py.
C	90DNS128	130.238	56.070	Double Anchor	Qz vein w/ msv gn in sediments.
D	90WG219E	130.051	55.986	Mountain View Mine	Qz w/ gn from mine dump.

* Abbreviations used in sample descriptions are listed in the appendix.

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APPENDIX

Abbreviations used in the sample descriptions:

adj	adjacent	hem	hematite
alt	altered	hnb	hornblende
an	andesite	hn	hornfels
ar	argillite	hw	hanging wall
aspy	arsenopyrite	ls	limestone
az	azurite	mag	magnetite
bt	biotite	mg	medium-grained
br	breccia (brecciated)	ml	malachite
calc	calcite	mo	molybdenite
cg	coarse-grained	monz	monzonite
cng	conglomerate	min	mineralized
chl	chlorite	msv	massive
cont	continuous	musc	muscovite
cp	chalcopyrite	pl	phyllite
di	diorite	po	pyrrhotite
dissem	disseminated	porph	porphyry (porphyritic)
ep	epidote	py	pyrite (pyritic)
fel	felsic	qt	quartzite
fest	iron stained	qz	quartz
fg	fine-grained	sed	sediment
fw	footwall	sc	schist
gd	granodiorite	sil	silicified
gn	galena	sl	sphalerite
gp	graphite (graphitic)	sulf	sulfide
gs	greenstone	volc	volcanic
gw	graywacke	w/	with
		xcut	crosscut/crosscutting