UNITED STATES DEPARTMENT OF INTERIOR

GEOLOGICAL SURVEY

Pb-isotope data base for sulfides from Alaska, March, 1987

by

S. E. Church[1], M. H. Delevaux[2], and J. E. Gray[1]

Open File Report 87-259

1987

[1]DFC, P. O. Box 25046, MS 973, Denver, CO 80225
[2]DFC, P. O. Box 25046, MS 963, Denver, CO 80225

CONTENTS

ILLUSTRATIONS

TABLES

APPENDICES

INTRODUCTION

The Pb-isotope data base for sulfide deposits in Alaska has come about in conjunction with the Alaska Mineral Resource Appraisal Program (AMRAP), and is a direct outgrowth of the USGS "Common-Pb in sulfides from Alaska" project. An extensive body of Pb-isotope data exists for the Canadian Cordillera (e.g. Godwin and others, 1982; Godwin and Sinclair, 1982) and for the North American Cordillera, but few previous determinations have been made of the numerous sulfide occurrences within Alaska. We have started gathering sulfide samples and anticipate analyzing up to 100 samples per year. We will concentrate in areas where the results will have the maximum impact on the assessment of the mineral endowment and geologic history of Alaska. We solicit the cooperation of geologists working in Alaska in the collection of well-documented samples for this project (see Appendix II). The primary objectives of the project are three-fold:

1.) to utilize Pb-isotope signatures, in conjunction with the regional mapping, to assess the relative ages and categorize the types of deposits studied,

2.) to relate the Pb-isotope and trace-element geochemical signatures of specific deposit and occurrences to ore-forming processes, and

3.) to use these data to correlate tectonostratigraphic terranes within the Cordillera.

PRESENTATION OF THE DATA

The data presented in Tables 1-6 represent the work completed on the project through March 1, 1987. The deposits are grouped by 1° x 3° quadrangle, and the state of Alaska is divided up into the six regions used in other regional data compilations by the U. S. Geological Survey (Figure 1). All abbreviations used in the data tables are documented in Appendix I. Mining regions and district names defined by the U. S. Bureau of Mines (Ransome and Kerns, 1954) have also been used throughout this report (Figure 2). Many of the deposits are briefly described by Berg and Cobb (1967); no attempt will be made in this report to summarize the voluminous literature on ore deposits that has been published since then.

Deposit Information

Information on each specific deposit or occurrence has been provided largely by the sample contributor (Contr.) on a form previously used in this project. However, the information on deposit characteristics has been assembled by S. E. Church, either from the information provided by the contributor or taken from the literature.

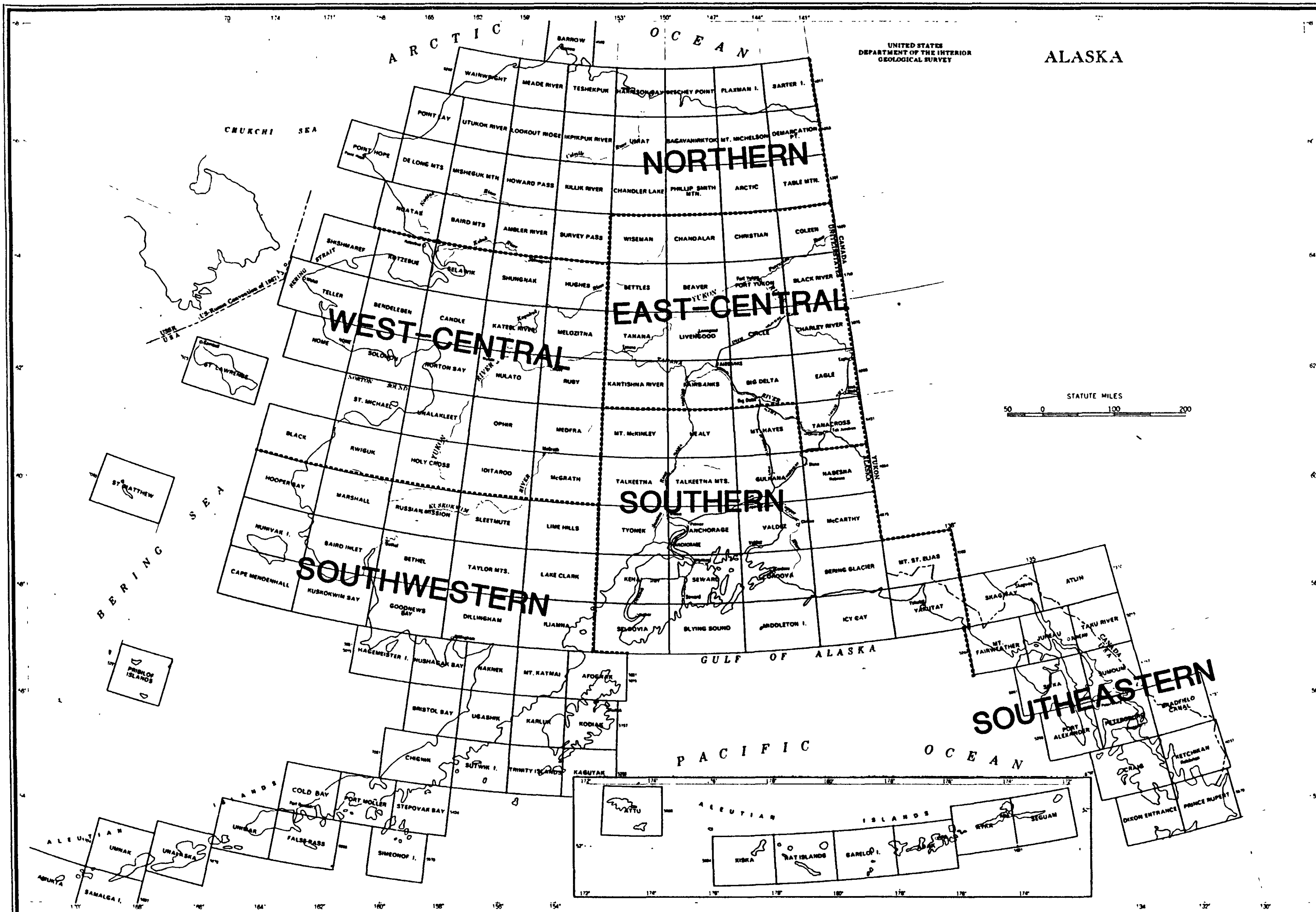

Figure 1. Regions of Alaska used in this report. Tables 1-6 give the analytical results for each region. Table 1: NORTHERN ALASKA, Table 2: WEST-CENTRAL ALASKA, Table 3: EAST-CENTRAL ALASKA, Table 4: SOUTHERN ALASKA, Table 5: SOUTHWESTERN ALASKA, Table 6: SOUTHEASTERN ALASKA.

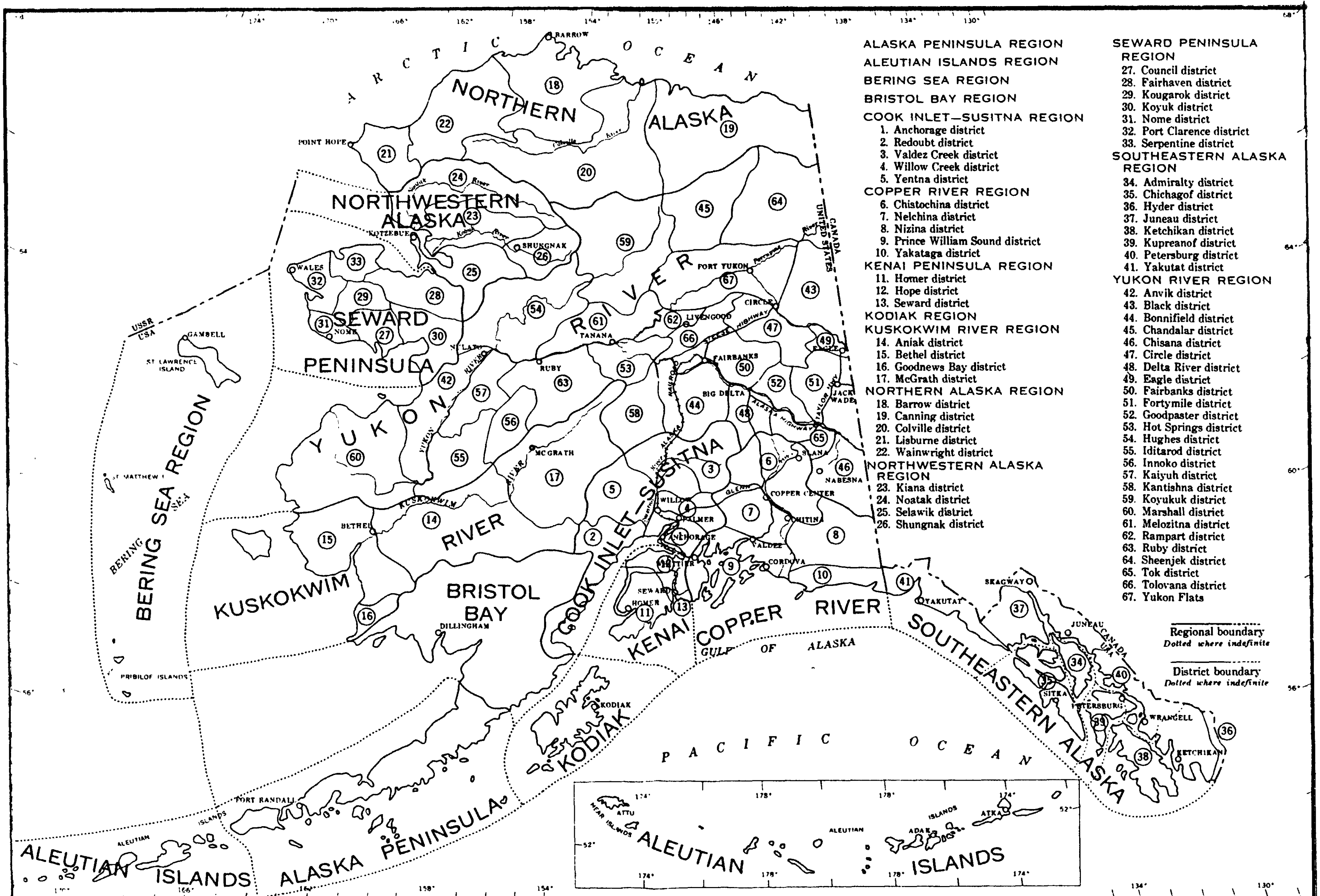

Figure 2. Mining regions and districts of Alaska (Ransome and Kerns, 1954). Abbreviations used in Tables 1-6 are defined in Appendix I; subdistricts are not included.

Contributors were given the opportunity to modify the descriptive data in the tables prior to publication. This process should have minimized errors. Blanks in the tables indicate a lack of information. The deposit classification used in this report is based on the recent compilation by Cox and Singer (1986) and is included here only for the purpose of dialogue. Certainly, there will not be widespread agreement amongst geologists on the classification of deposits into model types! We solicit any new information that knowledgeable readers might have on the classification of specific deposits that we have studied.

Geologic information on the deposit also has been obtained either from the sample contributor or from published literature. The sample source indicates whether the sample came from outcrop, core, dump, and so forth. The deposit characteristics are short summaries (limited to three words) which describe the host rock, structure, and texture of the deposit. Veins are characterized as predominantly calcite or quartz veins in the texture column and the sulfides are disseminated within the gangue minerals of the vein. Formation names have not been used, but the assemblage of rocks containing the deposit have been designated using the tectonostratigraphic terranes (TST) defined by Monger and Berg (1984) for southeastern Alaska (Table 6), and by Jones and others (1984) for the rest of Alaska. The reader is referred to these publications for detailed geologic and stratigraphic information on these rock assemblages. Abbreviations for the TST units are given in Appendix I.

Chemistry and Mass Spectrometry

Most of the Pb-isotope data presented in Tables 1-6 have been analyzed by M. H. Delevaux in the U. S. Geological Survey, Branch of Isotope Geology laboratories. However, there are isolated data published in other sources; these data have been included here for the sake of completeness. Pb-isotope data from the studies of whole-rock Pb, largely from Cenozoic volcanic rocks, have not been included in this data base. References to the whole-rock Pb data are cited in the Pb-isotope bibliography for Alaska. All of the results from references published since 1978 have been made using the silica-gel emitter method. These data have all been corrected for thermal fractionation using the NBS SRM-981 common-Pb standard (Catanzaro and others, 1968) and are accurate, at the 2 sigma level, to within $\pm$ 0.1 % or better. All new data reported here have a precision of 0.08 % better. Triple-filament analyses from reference 79.1 have a reported accuracy of 0.1 % per mass unit. Analyses reported in reference 70.1 were determined using the PbS method and were normalized to the CIT reference Pb value. These data have been corrected for thermal fractionation (Doe and Rohrbough, 1979) and have an uncertainty of about 0.15 % per mass unit. Older data from reference 60.1 were determined using the PbI method and are much less precise as no standards were run during that time period to correct for fractionation. Analytical results from reference 60.1 are enclosed in parentheses. Analyses done by Teledyne during the late 1970's have been shown to contain analytical errors (refs 80.1 and

86.5, p. 128-129). Our results on samples from the same localities, as well as from different localities in Alaska where we have access to unpublished Teledyne analyses, confirm these reported uncertainties. We recommend that data from this laboratory be used with caution or ignored.

Pb-isotopic determinations have been made largely on sulfides. We report analyses from two types of samples: analyses made on those that contain galena (indicated by GN in the sample mineralogy column) and analyses on either mixed sulfides or on other discrete sulfide phases. Where mixed sulfides have been analyzed, we have given the Pb concentration in the sample determined either by d.c.-arc emission spectrography or in the solution used for Pb-isotopic analysis using atomic absorption spectrophotometry. Previous studies of mixed sulfides, or of separate sulfide minerals that have 100 ppm or more of Pb, indicate that the Pb-isotopic data obtained from this type of sample are comparable to that obtained from galena (e.g. Church and others, 1986; ref 86.5).

Several different chemical procedures have been used on special samples analyzed in this study. In general, galenas have been hand-picked for analysis where possible. Galena samples were prepared for analysis by digestion with ultrapure hot HCl. The sample was purified by precipitation in concentrated HNO_3 (Delevaux and others, 1966), followed by electrodeposition on a platinum electrode from a very dilute HNO_3-$HClO_4$ solution at 1.8 volts, d.c.. Mixed sulfides were digested in hot ultrapure aqua regia, the solution was decanted and converted first to the chloride medium and then to the bromide medium. Lead was isolated from other cations using anion column exchange in the bromide medium; ultrapure reagents were used throughout the procedure. Blanks were in the subnanogram range and are negligible. The sample was loaded on the resin in 0.75M HBr, washed with 0.75M HBr and then with 1.5M HCl. The Pb was then eluted with 0.3M HNO_3-0.025M HBr. Molybdenites were prepared by digestion in hot ultrapure 6M HCl. A white precipitate, probably $Mo_3Cl_4(OH)_2 \cdot 2H_2O$, formed; the Pb remained in solution. Pb was purified by anion exchange in the HBr medium. High-antimony sulfides required special preparation because Sb is also adsorbed on the anion exchange resin in the HBr procedure described above. J. E. Gray has developed a chemical separation procedure that results in separation of most of the Sb from Pb in solution. We have applied this procedure to all our high-Sb solutions prior to loading on the anion exchange columns for final separation of Pb in the bromide medium. All Pb samples obtained from the column separation procedure were then electroplated as described above prior to mass spectrometric analysis.

The isotopic composition of Pb determined at the U. S. Geological Survey, Denver, Co., (Tables 1-6) was done on a 30.5 cm, 68° sector, solid-source mass spectrometer of NBS design. Duplicate analyses were made for all but one sample. Samples were run using the single Re-filament, silica-gel emitter technique at 1200 $\pm$ 20° C (Cameron and others, 1969). Two sets of eight ratio pairs for $^{204}Pb/^{206}Pb$ and one set each of eight ratio pairs for $^{207}Pb/^{206}Pb$ and for $^{208}Pb/^{206}Pb$ are taken over a period of 30 to 40 minutes in a typical analysis. Blanks in the data table indicate that the analytical work has not been completed. Analytical results can be expected from these samples in the next 12-18 months. Published data are indicated and the reference given using a year and reference # code (e.g., 70.1 indicates the first reference in the Pb-isotope bibliography for Alaska published in 1970, etc.). Unpublished results are included here for information only and will be published formally in interpretative manuscripts. Permission to use these data in other manuscripts should be obtained by writing S. E. Church.

ACKNOWLEDGMENTS

Research in the U. S. Geological Survey, particularly in Alaska, is a team effort. Certainly, we have not visited all of the deposits or occurrences from which we have analyzed samples. Many geologists who have worked or are now doing field studies in Alaska have contributed samples to this project. We could not conduct this survey without the contributions made by many who have visited mineralized areas in the field. To them, we express our thanks for providing samples and field information about each occurrence. Their efforts are acknowledged individually in the data tables; you are encouraged to contact them if you wish further information on a particular sulfide occurrence. Finally, I thank Bruce Doe for providing Pb-isotope data from several sulfide samples analysed by the USGS in the late 70's. Samples analysed under his project (BD) are noted in the data tables in the analyst column (e.g., HS/BD).

REFERENCES CITED

Berg, H. C. and Cobb, E. H., 1967, Metalliferous lode deposits of Alaska: U. S. Geological Survey Bulletin 1246, 254 p.

Cameron, A. E., Smith, D. H., and Walker, R. L., 1969, Mass spectrometric analysis of nanogram quantities of lead: Analytical Chemistry, v. 41, p. 525-526.

Catanzaro, E. J., Murphy, T. J., Shields, W. R., and Garner, E. L., 1968, Absolute isotopic abundance ratios of common, equal-atom, and radiogenic lead isotopic standards: Journal of Research, National Bureau of Standards, v. 72A, p. 261-267.

Church, S. E., LeHuray, A. P., Grant, A. R., Delevaux, M. H. and Gray, J. E., 1986, Lead-isotopic data from sulfide minerals from the Cascade Range, Oregon and Washington: Geochimica Cosmochimica Acta, v. 50, p. 317-328.

Cox, D. P. and Singer, D. A., eds., 1986, Mineral Deposits Models: U. S. Geological Survey Bulletin 1693, 379 p.

Delevaux, M. H., Pierce, A. P., and Antweiler, J. C., 1966, New isotopic measurements of Colorado ore leads, in: U. S. Geological Survey Professional Paper 550-C, pp. C178-C186.

Doe, B. R., and Rohrbough, Randall, 1979, Lead isotope data bank: 3,458 samples and analyses cited: U. S. Geological Survey Open-File Report 79-661, 136p.

Godwin, C. I. and Sinclair, A. J., 1982, Average lead isotope growth curves for shale-hosted zinc-lead deposits, Canadian Cordillera: Economic Geology, v. 77, p. 675-690.

Godwin, C. I., Sinclair, A. J. and Ryan, B. D., 1982, Lead isotope models for the genesis of carbonate-hosted Zn-Pb, shale-hosted Ba-Zn-Pb, and silver-rich deposits in the northern Canadian Cordillera: Economic Geology, v. 77, p. 82-94.

Jones, D. L., Siberling, N. J., Coney, P. J. and Plafker, G., 1984, Part A -- Lithotectonic terrane map of Alaska (west of the 141st meridian), in N. J. Siberling and D. L. Jones, eds., Lithotectonic terrane maps of the North American Cordillera. U. S. Geological Survey Open-File Report 84-523, pp. A1-A12, scale 1:2,500,000, 4 sheets.

Monger, J. W. H. and Berg, H. C., 1984, Part B -- Lithotectonic terrane map of western Canada and southeastern Alaska in N. J. Siberling and D. L. Jones, eds, Lithotectonic terrane maps of the North American Cordillera. U. S. Geological Survey Open-File Report 84-523, pp. B1-B31, scale 1:2,500,000, 4 sheets.

Ransome, A. L. and Kerns, W. H., 1954, Names and definitions of regions, districts, and subdistricts in Alaska: U. S. Bureau of Mines Information Circular IC-7679, 91 p.

Table 1. Pb-isotope data from sulfides from Northern Alaska

QUADRANGLE Locality Name	Sample No.	Latitude	Longitude	Sample Mineralogy	$^{206}Pb/^{204}Pb$	$^{207}Pb/^{204}Pb$	$^{208}Pb/^{204}Pb$
BAIRD MOUNTAINS							
Omar	OM074	67 29 34	160 52 39	cp, bn, tt, gn, py (100 ppm Pb)	20.464	15.721	38.208
Omar	OM122	67 29 32	160 52 37	cp (70 ppm Pb)	18.791	15.622	38.229
Powdermilk	85JS39	67 27 38	160 48 08	sl, GN, py, bar	18.164	15.577	37.989
Powdermilk	85JS109C	67 27 40	160 46	sl, GN, py, bar	18.194	15.590	38.050
Frost	83JS14V	67 25	160 45	bar, flu, cp, GN, sl	18.434	15.603	38.234
AMBLER RIVER							
Ruby Creek	DDH34:268	67 04 25	156 57 45	GN	18.233	15.589	38.084
Ruby Creek	DDH54:1676	67 04 25	156 57 45	GN	18.191	15.583	38.065
Ruby Creek	Adit @ 975'	67 04 25	156 57 45	GN	18.612	15.600	38.106
Ruby Creek	DDH40:970	67 04 25	156 57 45	GN, cp	18.576	15.590	38.091
Ruby Creek	DDH25:115	67 04 25	156 57 45	bn, tt			
Ruby Creek	DDH34:1014	67 04 25	156 57 45	gn, sl, cp			
Ruby Creek	DDH45:1030	67 04 25	156 57 45	py			
Ruby Creek	DDH93:2211	67 04 25	156 57 45	sl			
Smucker	DDH3:616	67 18	157 09	cp	18.358	15.601	38.240
Smucker (I-1)	SM-567	67 18	157 09	GN	18.397	15.661	38.202
Smucker	4B	67 18	157 09	cp, py			
Ambler #1	DDH1:117	67 16 30	157 02	cp, py			
Sunshine Crk	SSC-1	67 13 30	156 40	cp, sl, gn, py			
Dead Creek (I-2)	74AWM1610	67 13 10	156 32	GN	18.347	15.558	38.218
West Dead Crk	WDC	67 13 10	156 32	cp, py			
East Dead Crk	EDC	67 13 10	156 32	cp, py			
Arctic	AT12-3B	67 11 30	156 25 00	cp	18.308	15.569	38.061
Arctic	AT39-14	67 11 30	156 25 00	cp, py, gn	18.330	15.587	38.140
Arctic (I-3)	AC-1-77	67 11 30	156 25 00	GN	18.340	15.560	38.146
Arctic	DDH34:600	67 11 30	156 25 00	cp	18.365	15.598	38.177
SURVEY PASS							
BT (I-4)	BT-77	67 07	155 51	GN	18.393	15.651	38.270
BT	DDH4:145	67 07	155 51	cp, py			
Cynbad	DDH1:80	67 07	155 44	gn, sl, cp, py			
Sun	DDH21:43	67 04 30	155 01 30	py, cp, sl, gn			
Sun (I-5)	Sun-10	67 04 30	155 01 30	GN	18.244	15.561	37.975
Sun (I-6)	Sun-12	67 04 30	155 01 30	GN	18.200	15.517	37.904
Sun	DDH20:358	67 04 30	155 01 30	cp	18.304	15.591	38.105
Kiwi	DDH1:165	67 06	155 00	cp, py			
Arrigetch Crk	78AMH110D	67 26	154 03	sl, GN	18.300	15.579	38.050
Akabiuak Pass	78ADG202E	67 28	154 41	GN, sl, cp, asp	18.377	15.601	38.177
Beaver Crk	77AGK325C	67 07	155 24	GN, sl	18.497	15.604	38.206
U. Alatna area	77ADG340D	67 50	155 15	GN, cp, sl	18.364	15.591	38.274

Table 1. Pb-isotope data from sulfides from Northern Alaska (cont.)

Analyst	Sample Source	Deposit Characteristics: host rock	structure	texture	Deposit Type	Model No.	USBM Region/ District	TST	Age of Host	Age of Min.	Contr.	Publ. Pb Ref.
MD	O	carb-hstd	shear zn	breccia	Replc	32c	NW/Ki	AAE	D	>J	PF	87.4
MD	O	carb-hstd	crs-cuting	cal vein	Replc	32c	NW/Ki	AAE	D	>J	PF	87.4
MD	O	carb-hstd	stratabound	dissem	Replc	32	NW/Ki	AAE	O?	>J	JS	
MD	O	carb-hstd	stratabound	dissem	Replc	32	NW/Ki	AAE	O?	>J	JS	
MD	O	carb-hstd	shear zn	vein	FV		NW/Ki	AAE	O-D?	>J	JS	
HS/BD	C	carb-hstd	breccia		Replc	32c	NW/Sh	AAH	D		DC	86.1
HS/BD	C	carb-hstd	breccia		Replc	32c	NW/Sh	AAH	D		DC	86.1
HS/BD	D	carb-hstd		vein	Replc	32c	NW/Sh	AAH	D		DC	86.1
GSC	C	carb-hstd	crs-cuting	cal vein	Replc	32c	NW/Sh	AAH	D		RV	
	C	carb-hstd	crs-cuting	vein	Replc	32c	NW/Sh	AAH	D		DC	
	C	carb-hstd	crs-cuting	vein	Replc	32c	NW/Sh	AAH	D		DC	
	C	carb-hstd	breccia	dissem	Replc	32c	NW/Sh	AAH	D		DC	
	C	carb-hstd	crs-cuting	vein	Replc	32c	NW/Sh	AAH	D		DC	
GC	C	mvol-hstd	stratiform	dissem	K-VMS	28a	NW/Ki	AAH	D	D	RV	
TD	C	mvol-hstd	stratiform	dissem	K-VMS	28a	NW/Ki	AAH	D	D		82.1
	O	mvol-hstd	stratiform	dissem	K-VMS	28a	NW/Ki	AAH	D	D	DGGS	
	C	mvol-hstd	stratiform	dissem	K-VMS	28a	NW/Ki	AAH	D	D	DGGS	
	O	mvol-hstd	stratiform	dissem	K-VMS	28a	NW/Ki	AAH	D	D	JS	
TD	O	mvol-hstd	stratiform	dissem	K-VMS	28a	NW/Sh	AAH	D	D		82.1
	O	mvol-hstd	stratiform	dissem	K-VMS	28a	NW/Sh	AAH	D	D	DGGS	
	O	mvol-hstd	stratiform	dissem	K-VMS	28a	NW/Sh	AAH	D	D	DGGS	
ALH/BD	C	mvol-hstd	stratiform	dissem	K-VMS	28a	NW/Sh	AAH	D	D	DC	86.1
MD	C	mvol-hstd	stratiform	dissem	K-VMS	28a	NW/Sh	AAH	D	D	DC	87.3
TD	O	mvol-hstd	stratiform	dissem	K-VMS	28a	NW/Sh	AAH	D	D		82.1
GC	C	mvol-hstd	stratiform	dissem	K-VMS	28a	NW/Sh	AAH	D	D	RV	
						28a						
TD	O	mvol-hstd	stratiform	dissem	K-VMS	28a	NW/Sh	AAH	D	D		82.1
	C	mvol-hstd	stratiform	dissem	K-VMS	28a	NW/Sh	AAH	D	D	DGGS	
	C	mvol-hstd	stratiform	dissem	K-VMS	28a	NW/Sh	AAH	D	D	DGGS	
	C	mvol-hstd	stratiform	dissem	K-VMS	28a	NW/Sh	AAH	D	D	JS	
TD	C	mvol-hstd	stratiform	dissem	K-VMS	28a	NW/Sh	AAH	D	D		82.1
TD	C	mvol-hstd	stratiform	dissem	K-VMS	28a	NW/Sh	AAH	D	D		82.1
GC	C	mvol-hstd	stratiform	dissem	K-VMS	28a	NW/Sh	AAH	D	D	RV	
	C	mvol-hstd	stratiform	dissem	K-VMS	28a	NW/Sh	AAH	D	D	DGGS	
MD	O	sd-hstd	crs-cuting	qz vein	Pb-Zn skn	18c	YR/Kk	AAH	D	D	DG	87.3
MD	O	sd-hstd	crs-cuting	qz vein	Pm MTV	22c	NW/Nt	AAH	D	D	DG	87.3
MD	O	m/sd-hast	contact	replac	Pb-Zn skn	18c	NW/Sh	AAH	D	D	DG	87.3
MD	O	sd-hstd	crs-cuting	qz vein	FV	22c?	YR/Kk	AAE	D	D	DG	87.3

Table 1. Pb-isotope data from sulfides from Northern Alaska (cont.)

QUADRANGLE Locality Name	Sample No.	Latitude	Longitude	Sample Mineralogy	$^{206}Pb/^{204}Pb$	$^{207}Pb/^{204}Pb$	$^{208}Pb/^{204}Pb$
DELONG MOUNTAINS							
Red Dog	RD-63B	68 04 00	162 49 30	GN	18.409	15.598	38.238
Red Dog	78ARD-1	68 04 00	162 49 30	GN	18.414	15.602	38.254
Red Dog	LL26-18	68 04 00	162 49 30	GN	18.404	15.590	38.228
Red Dog	LL4-14	68 04 00	162 49 30	GN, bar	18.413	15.604	38.197
Red Dog	LL26-6B	68 04 00	162 49 30	sl, GN, py	18.403	15.602	38.254
Red Dog	A110sphA	68 04 00	162 49 30	sl	18.393	15.573	38.151
Red Dog	A110sphB	68 04 00	162 49 30	sl	18.404	15.585	38.181
Drinkwater	A109sph			sl	18.390	15.583	38.165
Lik	Lik	68 12	162 58	GN	18.422	15.614	38.298
Husky	HD-1	68 04	162 32	GN	18.475	15.608	38.309
MISHEGUK MOUNTAIN							
Ginny Creek	78Ek127A	68 17	161 16	GN, sl, ank, py	18.395	15.592	38.236
HOWARD PASS							
Drenchwater	78PM-052	68 35	158 42 30	GN	18.406	15.592	38.270
Drenchwater	77ANK-13H	68 35	158 42 30	GN, sl, bar	18.428	15.609	38.351
Story Creek	79Md194B	68 23	157 58	GN, sl	18.404	15.595	38.224
Story Creek	STA B-D	68 23	157 58	sl, GN, py	18.415	15.606	38.288
Story Creek	STA 1.77	68 23	157 58	sl, GN, py	18.427	15.599	38.272
Whoopee Crk	WHC-3	68 14	157 50	sl (1000 ppm Pb)	18.398	15.595	38.253
Whoopee Crk	WHC-10A	68 14	157 50	sl, GN	18.406	15.600	38.265
Kivliktort Mtn	AKD600B	68 18	156 38	GN	18.436	15.604	38.292
Koiyaktot Mtn	AKD601B	68 13	156 19	GN	18.422	15.609	38.304
KILLIK RIVER							
Outwash Crk	AKD605B	68 12	155 02	GN, sl, cp, py	18.404	15.605	38.315
Itilyiargiok Crk	AKD610B	68 07 35	155 16 45	GN, cp, sl	18.416	15.609	38.278
Kayak concretions	AKD613A	68 17 45	155 41 05	sl, GN, qz, blk cal concretions	18.583	15.611	38.450
Kakivilak Crk	AKD068	68 09 14	155 00 42	GN	18.490	15.604	38.271
Kikiktat Mtn	AKD073	68 22 36	154 47 37	cp (8 ppm Pb, 1 ms run only)	18.854	15.582	38.287
CHANDLER LAKE							
Inukpasugruk Crk	84AKD430R	68 05 00	151 49 35	py, cp (50 ppm Pb)			
Three River Mtn	84CL444R	68 04 30	151 39 22	py (200 ppm Pb)	18.753	15.627	38.870
Grizzly Crk	CL784R	68 05 38	150 43 13	GN, cal	18.658	15.622	38.638
Itkillik River	CL848R	68 14 45	150 24 05	GN	18.586	15.610	38.628
Thibideaux Mtn	84CL401	68 17 31	150 08 00	py (150 ppm Pb)			
PHILIP SMITH MTNS							
MF Chandalar R.	PS232RA	68 02 05	147 49 50	GN	18.545	15.606	38.285
MF Chandalar R.	76ARR47	68 01 40	147 52 30	GN	18.728	15.619	38.256
TABLE MOUNTAIN							
Bear Mtn	59ABeC-2C	68 22 20	142 02 00	GN, cp, ml	18.786	15.631	38.955
Bear Mtn	59ABeC-5A	68 22 45	142 00 30	GN, ml	18.760	15.624	38.938

Table 1. Pb-isotope data from sulfides from Northern Alaska (cont.)

Analyst	Sample Source	Deposit Characteristics: host rock	structure	texture	Deposit Type	Model No.	USBM Region/ District	TST	Age of Host	Age of Min.	Contr.	Publ. Pb Ref.
MD/BD	O	sh-hstd	stratiform	massive	SEDEX	31a	NA/Ls	AAD	M	M		85.2
MD/BD	O	sh-hstd	stratiform	massive	SEDEX	31a	NA/Ls	AAD	M	M		85.2
GC	O	sh-hstd		vein	SEDEX	31a	NA/Ls	AAD	M	M		80.1
GC	R	sh-hstd	banded	vein	SEDEX	31a	NA/Ls	AAD	M	M		80.1
GC	O	sh-hstd	breccia	qz vein	SEDEX	31a	NA/Ls	AAD	M	M		86.6
KM	O	sh-hstd	stratiform	massive	SEDEX	31a	NA/Ls	AAD	M	M		86.5
KM	O	sh-hstd	stratiform	massive	SEDEX	31a	NA/Ls	AAD	M	M		86.5
KM	O	sh-hstd	stratiform	massive	SEDEX	31a	NA/Ls	AAD	M	M		86.5
MD	C	sh-hstd	stratiform	dissem	SEDEX	31a	NA/Ls	AAD	M	M	MA	87.3
MD	O	sh-hstd	crs-cuting	vein	FV	31a?	NW/Nt	AAD	D	M	JH	87.3
GC	O	sh-hstd		vein	FV	31a?	NW/Nt	AAD	D	eM		86.6
GC	O	sh-hstd	stratiform	dissem	SEDEX	31a	NA/Cv	AAD	M	M		85.2
MD/BD	O	sh-hstd	stratiform	dissem	SEDEX	31a	NA/Cv	AAD	M	M		80.1
GC	O	sd-hstd	breccia	massive	FV	31a?	NA/Cv	AAD	M	eM		80.1
MD	O	sd-hstd	crs-cuting	vein	FV	31a?	NA/Cv	AAD	M	eM	JS	87.3
MD	O	sd-hstd	breccia	vein	FV	31a?	NA/Cv	AAD	M	eM	JS	87.3
MD	O	sd-hstd	crs-cuting	vein	FV	31a?	NA/Cv	AAE	D	eM	JS	87.3
MD	O	sd-hstd	breccia	vein	FV	31a?	NA/Cv	AAE	D	eM	JS	87.3
MD	O	ss-hstd	crs-cuting	vein	FV	31a?	NA/Cv	AAE			SC	
MD	O	ss-hstd	stratiform	dissem	FV	31a?	NA/Cv	AAE			SC	
MD	R	sd-hstd	crs-cuting	qz vein	FV		NA/Cv	AAE	D		SC	
MD	O	sd-hstd	crs-cuting	vein	mV		NA/Cv	AAE	D		SC	
MD	R	shale	stratiform		syngen		NA/Cv	AAE	M	M	SC	
MD	R	m/sd-hstd	crs-cuting	qz vein	mV		NA/Cv	AAE	D		SC	
MD	O	mvolcanics		opn-sp fil			NA/Cv	AM	J?		SC	
	O	cong-hstd	stratiform	dissem	cement		YR/Kk	AAE	D		SC	
MD	O	cong-hstd	stratiform	dissem	cement		YR/Kk	AAE	D		SC	
MD	R	thrust zn	shear zn	qz/cal vein	mV		YR/Kk	AAE	M		SC	
MD	R	m/sd-hstd	crs-cuting	qz vein	mV		NA/Cv	AAE	D		SC	
	O	cong-hstd	stratiform	dissem	cement		NA/Cv	AAE	D		SC	
MD	O	carb-hstd	crs-cuting	vein	FV		YR/Cl	AAE	D		JC	
MD	O	carb-hstd	crs-cuting	qz vein	FV		YR/Cl	AAE	D		JC	
MD	O	felsic dike	shear zn	qz vein	Pm-MTV	22c? 16?	YR/Sj	AAN	Pz	56my	WB	
MD	O	m/sd-hstd		vein	Pm-MTV	22c? 16?	YR/Sj	AAN	Pz	56my	WB	

Table 2. Pb-isotope data from sulfides from West-Central Alaska

QUADRANGLE Locality Name	Sample No.	Latitude	Longitude	Sample Mineralogy	$^{206}Pb/^{204}Pb$	$^{207}Pb/^{204}Pb$	$^{208}Pb/^{204}Pb$
IDITAROD							
Cirque Prospect	I-0096RC	62 50 45	156 58 29	cp, py, (35000 ppm Pb)	18.923	15.607	38.583
Tolstoi Prospect	I-0099R	62 55 03	156 58 45	cp, py, gn, tu (7000 ppm Pb)	18.915	15.600	38.554
Snow Gulch	I-032	62 03 39	158 11 15	st (500 ppm Pb)	18.961	15.616	38.649
Willow Creek	I-280	62 21 25	156 59 00	st, cn (75 ppm Pb)	18.869	15.616	38.509
Decourcy Mine	I-036	62 03 34	158 27 22	st, cn (80 ppm Pb)	18.854	15.605	38.580
Granite Creek	I-001RB	62 28 54	157 54 41	st, tn, sch, cs (10000 ppm Pb)	18.838	15.592	38.429
Golden Horn	I-GHA	62 26 55	157 55 05	asp, tn, st, sch, Au (10000 ppm Pb)	18.872	15.591	38.457
Independence Mine	I-122A	62 56 53	156 28 42	py, cp (1500 ppm Pb)	18.837	15.598	38.546
TELLER							
Lost River	73AGK31B	65 28 10	167 09 30	GN	18.961	15.627	38.847
Bessie & Maple	73AGK12G	65 27	167 12	GN	18.961	15.628	38.854
Reed	73AGK14AC	65 31	167 10	GN	18.959	15.630	38.847
Hume Creek granite	ATS184A	64 54	166 05	Feldspar	18.94	15.67	38.76
BR granite	60ASN145	65 31 30	167 10	Feldspar	19.05	15.67	38.96
SOLOMON							
Wheeler	SPB-1-82B	64 59	164 38	GN, py, ank, mt, flu	18.408	15.607	38.263
Dry Canyon	83AGe61A	64 51 43	162 27 20	py, gn, sl (500 ppm Pb)	19.050	15.638	38.833
BENDELEBEN							
Omilak	83AGe72c	65 02 34	162 39 35	st, GN, py, asp, cp	20.136	15.710	38.844
Windy Creek	SPB-8-82A	65 11	162 36	mly, flu			
Pargon River	SPB-19-82	65 12	163 49	GN, cp, ml, lm, py, ch	18.921	15.608	38.753
Marble Breccia	SPB-21-82B	65 12	163 52	cp, ml, lm, mt, cr	18.901	15.611	38.722
Hannum Creek	SPB-31-82D	65 55 30	163 21	GN, py, lm	19.012	15.629	38.879
Hannum Creek	SPB-1-83	65 55 30	163 21	GN, sl	18.966	15.621	38.848
Independence	SPB-33-82D	65 40	162 28	GN, pl, lm, tt	18.904	15.630	38.760
Foster	OMB-5-82	65 02	162 35	GN	19.382	15.656	38.811
Foster	83GD-1	65 01	162 35	GN, py, lm	19.188	15.641	38.820
NOME							
Thompson	86AGe001A	64 47 05	165 10 10	py, asp, sl, gn (2% Pb)			
Quarry barite	86AGe002C	64 42 07	165 46 00	bar, gn, sl, ml (2% Pb)			
Aurora Creek	86AGe006B	64 43 07	165 36 32	gn, sl, py, ml (1000 ppm Pb)			
Galena	86AGe008Y	64 44 11	165 49 31	gn, sl, hm (1% Pb)			
Steep Creek	86AGe025A	64 45 57	165 23 24	gn, sl, ml (2% Pb)			

Table 2. Pb-isotope data from sulfides from West-Central Alaska (cont.)

Analyst	Sample Source	Deposit Characteristics: host rock	structure	texture	Deposit Type	Model No.	USBM Region/ District	TST	Age of Host	Age of Min.	Contr.	Publ. Pb Ref.
MD	O	monzonite	shear zn	qz vein	Pm-MTV	22c	YR/In	K	K		JG	
MD	R	monzonite	shear zn	qz vein	Pm-MTV	22c	YR/In	K	K		JG	
MD	P	sd-hstd	crs-cuting	qz vein	Pm-MTV	22c	YR/Id	K	K		JG	
MD	P	sd-hstd	breccia	qz vein	Pm-MTV	22c	YR/Id	K	K		JG	
MD	R	sd-hstd	breccia	qz/cal vein	Pm-MTV	22c	YR/Id	K	K		JG	
MD	M	sd-hstd		qz vein	Pm-MTV	22c	YR/Id	K	K		JG	
MD	P	monzonite	concordant	contact	Pm-MTV	22c	YR/Id	K	K		JG	
MD	P	dacite dike	dissem	qz/cal vein	Pm-MTV	22c	YR/Id	K	K		JG	
MD/BD	O	granite		qz vein	Pm	22c	SP/Pc	YO	86 Ma	86 Ma	DG	
MD/BD	O	granite		qz vein	Pm	22c	SP/Pc	YO	86 Ma	86 Ma	DG	
MD/BD	O	granite		qz vein	Pm	22c	SP/Pc	YO	86 Ma	86 Ma	DG	
MD	O	granite			rk							70.1
MD	O	granite			rk							70.1
MD	P	m/sd-hstd	stringers	qz vein	FV		SP/Kg	SD			JB	
MD	P	grndiorite	gossan	vein	Pm-MTV	22a	SP/Co	SD	K	K?	BG	
MD	D	marb-hstd	stratabound	replac?	Replc?	19a?/31a?	SP/Co	SD	Pz	Pz?	BG	
	O	monzonite	stringer	qz vein	MTV		SP/Ky	SD			JB	
MD	O	felsic dike	shear zn	qz vein	Pm-MTV	22c	SP/Co	SD	K	K	JB	
MD	R	mvol-hstd	breccia	replac	Replc	19a	SP/Co	SD		K	JB	
MD	P	m/sd-hstd	stratiform	dissem	SEDEX	31a	SP/Fh	SD	lC	lC	JB	
MD	P	m/sd-hstd	stratiform	dissem	SEDEX	31a	SP/Fh	SD	lC	lC	JB	
MD	P	m/sd-hstd	crs-cuting	replac	Pm-MTV	22c	SP/Fh	SD		K	JB	
MD	R	marb-hstd	shear zn		mV	36	SP/Co	SD			JB	
MD/BD	R	marb-hstd	shear zn		mV	36	SP/Co	SD			DG	
	P	m/sd-hstd	stratiform	dissem	SEDEX	31a	SP/Nm	SD	O	O?	BG	
	Q	m/sd-hstd	stratiform	dissem	SEDEX	31a	SP/Nm	SD	O	O?	BG	
	R	m/sd-hstd	stratiform	dissem	SEDEX	31a	SP/Nm	SD	O	O?	BG	
	P	m/sd-hstd	breccia	dissem	SEDEX	31a	SP/Nm	SD	O	O?	BG	
	P	carb-hstd	stratabound	dissem	SEDEX	31a	SP/Nm	SD	O	O?	BG	

Table 3. Pb-isotope data from sulfides from East-Central Alaska

QUADRANGLE Locality Name	Sample No.	Latitude	Longitude	Sample Mineralogy	$^{206}Pb/^{204}Pb$	$^{207}Pb/^{204}Pb$	$^{208}Pb/^{204}Pb$
FAIRBANKS							
St Patricks Mine	63091	64 52 25	147 29 10	st, Au, gn			
Rogosh Prospect	84ASCF08	64 53 35	147 59 15	GN, sl, py, Au	19.102	15.638	39.105
Yellow Pup	63122	64 59 10	147 19 35	st, Au			
Cleary Schist	84ASCF13	64 47 35	148 08 40	lm (<10 ppm Pb)			
Liberty Bell	63178	64 03 05	148 51 00	bis, Au			
Flume Creek	FC-1	64 00 50	147 17 30	GN	19.168	15.669	39.058
BIG DELTA							
Porcupine Creek	78AFr231	64 35 30	144 26 30	GN	18.788	15.650	39.043
Black Shell Creek	78AFr238	64 52 54	145 37 30	GN	18.431	15.662	38.379
EAGLE							
40 mile	JA001	64 07 30	141 06 15	GN, Au	19.382	15.671	39.255
McKibben's Prospect	75AFr105	64 06 35	143 12 10	GN, st			
TANANA							
Manley dome	MHS	65 02 00	150 44 10	GN, lm	20.840	15.838	40.777
Cooney Creek	63212	65 08 25	150 42 30	GN, Au, cn, py	18.901	15.629	38.715
Omega Creek	63200	65 10 50	150 19 30	GN, Au	18.993	15.652	38.764
LIVENGOOD							
Geraghty Mine	G-1	65 29 55	148 30 40	GN	19.004	15.636	38.793
Nordell Mine	84ASCF04A	65 04 55	147 22 50	GN, sl, py, cp	19.139	15.694	39.214
Pedro Dome		65 02 00	147 30 00	GN	19.118	15.688	39.146
Silver Fox	Busty Bell	65 00 30	147 33 15	GN	19.126	15.693	39.177
Steamboat Creek		65 01 30	147 30 00	GN	19.132	15.685	39.160
Chechacko Vein	TS-1(Gem)	65 03 42	147 27 45	GN, py, sl	19.046	15.619	38.961
Cleary Road	TS-2	65 02 50	147 27 10	GN, st, lm	19.087	15.663	39.044
Cleary Hill	63134	65 02 50	147 27 10	cp, st, GN	19.127	15.680	39.176
Wackowitz	TS-3	65 02 45	147 30 00	GN, st, lm	19.027	15.612	38.932
Gem Claim	JA071M(TS1)	65 03 42	147 27 45	GN	19.158	15.709	39.264
Christina Vein	84ASCF06	65 04 20	147 22 40	GN, asp	19.139	15.696	39.226
Hi Yu	63132	65 04 35	147 16 40	py, cp, GN	19.161	15.693	39.224
CIRCLE							
Faith Creek	84CI015R	65 23 40	146 15 50	GN, sl, st, asp, py	19.136	15.715	39.291
Gold Dust	63176	65 25 00	145 28 15	GN, Au, py, gt	19.041	15.676	39.034
Independence Crk	83AMZ036E	65 27 33	145 13 27	GN, py			

Table 3. Pb-isotope data from sulfides from East-Central Alaska (cont.)

Analyst	Sample Source	Deposit Characteristics: host rock	structure	texture	Deposit Type	Model No.	USBM Region/ District	TST	Age of Host	Age of Min.	Contr.	Publ. Pb Ref.
	M	granite	lens	qz vein	Pm-MTV	22c?/27d?	YR/Fb	YT		K	JA	
MD	P	granite		qz vein	Pm-MTV	22c	YR/Fb	YT		K	SC	
	S				Plc-Au	39	YR/Fb	YT			JA	
MD	Q	mvol-hstd	stratiform	dissem	K-VMS	28a	YR/Fb	YT			SC	
	D	m/sd-hstd	crs-cuting	vein	FV		YR/Bf	YT			JA	
MD	D			vein	FV		YR/Bf	YT			JA	
ALH	O	m/sd-hstd	stratiform	dissem	K-VMS	28a?/31a?	YR/Fb	YT	Pz?	Pz?	HF	
MD	O	m/sd-hstd		replac	Pm-MTV	22c?/18c?	YR/Fb	YT	Pz?	K-Cz?	HF	
MD	P	m/sd-hstd	crs-cuting	qz vein	FV		YR/Ea	YT	Pz?		JA	
	O	m/sd-hstd	crs-cuting	qz vein	Pm-MTV	22c?/27d?	YR/Ci	YT	Pz?		HF	
MD	O		crs-cuting	vein	Pm-MTV	22c	YR/Hs	MAN			JC	
MD	S				Plc-Au	39	YR/Hs	MAN			JC	
MD	S				Plc-Au	39	YR/Hs	MAN			JC	
MD	S				Plc-Au	39	YR/Tv	LG			JC	
MD	M		crs-cuting	qz vein	Pm-MTV	22c	YR/Fb	YT			SC	
MD	O			vein	Pm-MTV	22c	YR/Fb	YT				79.1
MD	M	granite		vein	Pm-MTV	22c	YR/Fb	YT				79.1
MD	D			vein	Pm-MTV	22c	YR/Fb	YT				79.1
TD	P	m/sd-hstd	shear zn	replac	Replc	19a	YR/Fb	YT	Pz?		TS	
TD	O	m/sd-hstd	concordant	qz vein	Pm-MTV	22c	YR/Fb	YT	Pz?		TS	
MD	O	m/sd-hstd	shear zn	qz vein	Pm-MTV	22c	YR/Fb	YT	Pz?		JA	
TD	O	m/sd-hstd	concordant	qz vein	Pm-MTV	22c	YR/Fb	YT	Pz?		TS	
MD	P	m/sd-hstd	shear zn	qz vein	Pm-MTV	22c	YR/Fb	YT			JA	
MD	P	m/sd-hstd		qz vein	Pm-MTV	22c	YR/Fb	YT			SC	
MD	P	m/sd-hstd		qz vein	Pm-MTV	22c	YR/Fb	YT			JA	
MD	O	m/sd-hstd	crs-cuting	qz vein	Pm-MTV	22c	YR/Ci	YT	Pz?		RT	
MD	S				Plc-Au	39	YR/Ci	YT			JA	
	O	m/sd-hstd	crs-cuting	qz vein	Pm-MTV	22c	YR/Ci	YT	Pz?		WM	

Table 3. Pb-isotope data from sulfides from East-Central Alaska (cont.)

QUADRANGLE Locality Name	Sample No.	Latitude	Longitude	Sample Mineralogy	$^{206}Pb/^{204}Pb$	$^{207}Pb/^{204}Pb$	$^{208}Pb/^{204}Pb$
WISEMAN							
RO-1	DDH1:50	67 08 30	152 54	GN, cp			
Frog	many	67 18 45	153 00	cp, sl			
Frog (Dnx 78)	W-218	67 18 51	152 55 30	GN, sl, asp, py	17.837	15.553	37.508
McCamant Crk	W-1290A	67 22 58	151 58 47	GN, ml	18.369	15.586	38.182
Michigan Crk	W-1943	67 17 25	151 19 25	GN	19.310	15.666	39.103
Smith Dome	W-1739B	67 28 00	150 08 30	st (700 ppm Pb)	18.466	15.608	38.631
NF Koyukuk R.	W-2120	67 45 20	151 00 40	sl, cp, bar, py, Au, gn			
Amawk Crk	W-972	67 58 30	150 30 00	cr, GN, cp, sl, bar, asp, Au	18.703	15.623	38.778
Amawk Crk	W-2232	67 58 25	150 29 00	GN	18.704	15.629	38.785
CHANDALAR							
Mikado mine	Mikado	67 32 40	148 13 40	GN, asp, py, sl, st, Au	18.804	15.662	38.938
Mikado mine	86-Mikado	67 32 40	148 13 40	GN, sl, py, Au	18.787	15.633	38.820
Summit mine	SM-1	67 32 30	148 12	GN, asp, py, Au	18.766	15.633	38.845

Table 3. Pb-isotope data from sulfides from East-Central Alaska (cont.)

Analyst	Sample Source	Deposit Characteristics host rock	Deposit Characteristics structure	Deposit Characteristics texture	Deposit Type	Model No.	USBM Region/ District	TST	Age of Host	Age of Min.	Contr.	Publ. Pb Ref.
	C	mvol-hstd	stratiform	dissem	K-VMS	28a	YR/Kk	AAH	D	D	DGGS	
	C	carb-hstd		vein/replac	mPb-Zn skn	18c	YR/Kk	AAH	1S-eD?	Pc?	DGGS	
MD	O	scht-hstd		vein	mPm-FV	22c	YR/Kk	AAH	Pc	Pc	JC	
MD	O	m/sd-hstd		qz vein	Pm-MTV	22c	YR/Kk	AAH	D	D	JC	
MD	O	m/sd-hstd	crs-cuting	qz vein	mV	36a	YR/Kk	AAC	D	J?	JC	
MD	O	m/sd-hstd	crs-cuting	vein	Sb-FV	27d?/22c?	YR/Kk	AAH	D		JC	
	O	m/sd-hstd	crs-cuting	qz vein	FV		YR/Kk	AAN	C-S		JC	
MD	O	m/sd-hstd	shear zn	vein	Pm-MTV	22c	YR/Kk	AAE	D	>D	JC	
MD	O	m/sd-hstd	crs-cuting	vein	Pm-MTV	22c	YR/Kk	AAE	D	>D	JC	
TD	M	m/sd-hstd	shear zn	qz vein	FV		YR/Cl	AAH	D			83.1
MD	M	m/sd-hstd	shear zn	qz vein	FV		YR/Cl	AAH	D		SR	
MD	M	m/sd-hstd	shear zn	qz vein	FV		YR/Cl	AAH	D		SR	

Table 4. Pb-isotope data from sulfides from Southern Alaska

QUADRANGLE Locality Name	Sample No.	Latitude	Longitude	Sample Mineralogy	$^{206}Pb/^{204}Pb$	$^{207}Pb/^{204}Pb$	$^{208}Pb/^{204}Pb$
BLYING SOUND							
Resurrection Pen.	RP-1	59 57 30	149 16 00	GN, py, sl	18.788	15.566	38.366
SEWARD							
Beatson	81AKK008B	60 30 15	147 53 40	po, cp, py	19.125	15.652	38.883
Beatson	BTS-2	60 30 15	147 53 40	po, cp (80 ppm Pb)	19.090	15.638	38.808
Rua Cove	81AKK006M	60 21 10	147 38 40	po (10 ppm Pb)	19.164	15.618	38.665
Lynx Creek	81BS115H	60 40 20	149 19 30	py, cp (140 ppm Pb)	18.561	15.517	38.134
Shell	81BS116BB	60 40 20	149 32 30	gn, lm (1800 ppm Pb)	19.041	15.635	38.758
Oracle	81BS113AA	60 36 45	149 34 20	GN, asp, Au	19.009	15.626	38.720
Four-mile	PB-1	60 10 25	149 26 40	sl, cp, po, GN, Au	18.989	15.621	38.659
Primrose	PR-7	60 19 40	149 25 00	asp, Au, GN, sl, py, cp, po	19.020	15.630	38.709
Hirshey-Carlson	HC	60 47 45	149 31 50	asp, GN, sl, Au	19.065	15.649	38.824
Kenai Star	KS-1	60 49 25	149 30 55	GN	19.058	15.644	38.813
Lucky Strike	LS-1	60 46 40	149 33 10	sl, asp, py, GN, Au, ank	19.065	15.645	38.811
Granite Mine	GR-1	60 58 15	148 12 30	py, GN, sl, po, asp, st, cp, Au	18.920	15.600	38.567
Bird Point	SD81009R	60 55 40	148 21 30	asp, po, GN	18.996	15.628	38.719
Cedar Bay	CB-1	60 57 25	147 22 30	cp, asp, sl, po (3000 ppm Pb)	19.096	15.635	38.759
Culross	3386	60 44 10	148 10 25	gn, sl, py, Au (220 ppm Pb)	19.005	15.620	38.662
CORDOVA							
Scott Glacier	047D	60 38 40	145 15 00	cp, py (1000 ppm Pb)	19.066	15.629	38.721
Copper Mtn.	C004	60 51 25	146 34 15	cp, po (240 ppm Pb)	18.969	15.600	38.607
Reynolds	C026AA	60 53 10	146 37 20	cp (75 ppm Pb)	18.945	15.600	38.580
Schlosser	C023A-25	60 46 25	146 24 50	cp (20 ppm Pb)	18.946	15.614	38.713
Fidalgo	74AK29A	60 47 40	146 17 45	cp, po	19.174	15.653	38.844
Ellamar	82DG004A	60 53 25	146 38 30	cp, py, po, sl (70 ppm Pb)	18.917	15.607	38.579
McKinley Lake	MK-1	60 28 25	145 11 25	GN, py, asp, sl, Au	19.054	15.632	38.729
ANCHORAGE							
Miner's River	MR-1	61 05 15	147 20 00	GN, sl, py, cp, asp	19.060	15.627	38.722
Homestake	HO-12	61 09 15	148 09 15	GN, ank	18.966	15.610	38.636
Independence	6543R	61 47 18	149 18 20	gn, cp (1000 ppm Pb)	18.827	15.590	38.499
Holland	6544R	61 49 00	149 17 27	cp, tt (200 ppm Pb)	18.867	15.593	38.523
Grubstake Gulch	W17A	61 44 55	149 24 50	py, lm (300 ppm Pb)	18.948	15.607	38.630
Jewel	Jewel	61 02 10	149 06 10	GN, asp	18.963	15.620	38.670
Bruno-Agostino	GD-12	61 02 50	149 06 10	cp, GN, mly, Au	18.940	15.591	38.560
Miner's Bay	81AMH070A,C	61 05 20	146 26 00	cp, pn, po			

Table 4. Pb-isotope data from sulfides from Southern Alaska (cont.)

Analyst	Sample Source	Deposit Characteristics: host rock	structure	texture	Deposit Type	Model No.	USBM Region/ District	TST	Age of Host	Age of Min.	Contr.	Publ. Pb Ref.
MD	R	ophiolite	shtd-dike	qz-vein	C-VMS	24a	KP/Sw	CG	K-Cz	K-Cz	SN	
MD	O	sd-hstd	stratiform	massive	K-VMS	28a	CR/Pw	PW	Te	Te	RK	
MD	O	sd-hstd	stratiform	massive	K-VMS	28a	CR/Pw	PW	Te	Te	RG	
MD	O	ophiolite	lens	massive	C-VMS	24a	CR/Pw	PW	Te	Te	RK	
MD	O	sd-hstd	stratabound	massive	K-VMS	28a	CR/Pw	CG	Te	Te	MS	
MD	M	felsic dike	fract zn	qz vein	Pm-MTV	22c	KP/Hp	CG	Te	53 Ma	MS	
MD	M	felsic dike	fract zn	qz vein	Pm-MTV	22c	KP/Hp	CG	Te	53 Ma	MS	
MD	M	m/sd-hstd	shear zn	opn-sp fil	mAu-V	36a	KP/Hp	CG	Te		RG	
MD	M	m/sd-hstd	shear zn	opn-sp fil	mAu-V	36a	KP/Sw	CG	Te		RG	
MD	M	m/sd-hstd	shear zn	opn-sp fil	mAu-V	36a	KP/Hp	CG	Te		RG	
MD	M	felsic dike	fract zn	qz vein	Pm-MTV	22c	KP/Hp	CG	Te	53 Ma	RG	
MD	M	m/sd-hstd	shear zn	opn-sp fil	mAu-V	36a	KP/Hp	CG	Te		RG	
MD	M	granite	shear zn	opn-sp fil	mAu-V	36a	CR/Pw	CG			RG	
MD	M	m/sd-hstd	shear zn	opn-sp fil	mAu-V	36a	CS/An	CG	Te		RT	
MD	O	granite	shear zn	qz vein	Pm-MTV	22c	CR/Pw	PW	Te	Te	RG	
MD	M	mvol-hstd	shear zn	qz vein	mAu-V	36a	CR/Pw	PW	To	35 Ma?	MS	
MD	M	m/sd-hstd	stratiform		K-VMS	28a	CR/Pw	PW	Te	Te	RG	
MD	D	m/sd-hstd		massive	K-VMS	28a	CR/Pw	PW	Te	Te	MS	
MD	M	m/sd-hstd		massive	K-VMS	28a	CR/Pw	PW	Te	Te	MS	
MD	M	m/sd-hstd	lens	massive	K-VMS	28a	CR/Pw	PW	Te	Te	MS	
MD	M	mvol-hstd	shear zn	massive	K-VMS	28a	CR/Pw	PW	Te	Te	SN	
MD	D	m/sd-hstd	lens	massive	K-VMS	28a	CR/Pw	PW	Te	Te	RG	
MD	O	m/sd-hstd	shear zn	opn-sp fil	mAu-V	36a	CR/Pw	PW	To	<35 Ma	RG	
MD	M	m/sd-hstd	shear zn	opn-sp fil	FV		CR/Pw	PW	Te		RG	
MD	M	m/sd-hstd	shear zn	opn-sp fil	mAu-V	36a	CR/Pw	CG	To		RG	
MD	M	tonalite	shear zn	opn-sp fil	Pm-MTV	22c	CR/Wl	PE	K-T	66 Ma	DM	
MD	M	tonalite	magmatic	opn-sp fil	Pm-MTV	22c	CR/Wl	PE	K-T	66 Ma	DM	
MD	P	m/sd-hstd	concordant	qz vein	FV		CR/Wl	PE	J		MS	
MD	M	m/sd-hstd	shear zn	opn-sp fil	mAu-V	36a	CR/An	CG	Te		SC	
MD	M	m/sd-hstd	shear zn	opn-sp fil	mAu-V	36a	CR/An	CG	Te		RG	
	O	diorite	magmatic	dissem/vein			CR/Pw	CG	Te	Te	SN	

Table 4. Pb-isotope data from sulfides from Southern Alaska (cont.)

QUADRANGLE Locality Name	Sample No.	Latitude	Longitude	Sample Mineralogy	$^{206}Pb/^{204}Pb$	$^{207}Pb/^{204}Pb$	$^{208}Pb/^{204}Pb$
VALDEZ							
Midas Mine level 3	MI-20	61 00 40	146 16 00	cp, py	19.113	15.636	38.745
Donohue	Donohue	61 11 50	146 11 45	GN, sl, Au	19.049	15.642	38.762
Upper Millioneer	UM	61 13 10	146 21 30	GN, sl, Au	18.937	15.618	38.668
Mayfield	MA-1	61 09 30	146 48 00	py, cp, GN, sl, asp, Au	18.939	15.610	38.644
MCCARTHY							
Nelson Prospect	NM-1	61 27	142 23	cp			
TALKEETNA							
Boulder Creek	73AR127	62 54	150 09	GN	19.129	15.643	38.874
Boulder Creek	73AR144	62 54	150 09	GN	19.146	15.654	38.918
Mt. Foraker	MF-1	62 44 45	151 49 45	mly			
Shellabarger Pass	many	62 33 30	152 47 30	gn, cp, sl			
Copper skarn	TCS-1	62 32 45	152 13	cp			
TALKEETNA MOUNTAINS							
Coal Creek	many	62 59	149 50	cs, sl, po, asp, gn, tp, tu			
GULKANA							
Hogan Hill	85AIL027B	62 41 13	145 26 40	py, cp, bn, sl, gn			
NABESNA							
Rambler	84AIL068A	62 23 00	143 03 00	mt, cp, py			
Orange Hill	many	62 14 30	142 51 00	cp, mly, py			
Bond Creek	many	62 13	142 44	cp, py			
MT McKINLEY							
Bunnell Mine	BMO-1	63 28 50	151 04 15	GN, tt, st, sl, cp, sch	19.195	15.656	38.920
USBM Little Maud	DDH5:46-50	63 62 30	150 57 20	GN, asp, py, lm			
USBM Jupiter-Mars	DDH12:226	63 33 25	150 53 00	GN, sl, py, lm			
USBM Jupiter-Mars	DDH12:267	63 33 25	150 53 00	GN, sl, py, lm			
USBM Jupiter-Mars	DDH16:165	63 33 15	150 53 45	GN, tt, asp, py, lm			
USBM Galena	DDH17:236	63 32 15	150 50 58	GN, asp, py, tt			
HEALY							
Dry Creek (Red Mtn)	DC-9	63 55 25	147 23 15	GN, cp	18.765	15.675	38.824
West Fork L Delta R.	WF-1	63 48 10	147 29 40	cp, py (5000 ppm Pb)	18.728	15.688	38.699
Cirque	C-3	63 47 00	147 38 00	py, cp (2000 ppm Pb)	18.742	15.690	38.706
Virginia Creek	VC-2	63 49 35	147 48 00	cp, py (1500 ppm Pb)	18.821	15.695	38.709
Anderson Mtn	AM-3	63 48 35	147 55 50	cp, py, gn (3000 ppm Pb)	18.884	15.699	38.709
Snow Mtn Gulch	SMG-1	64 00 00	147 25 00	GN, sl	18.680	15.678	38.845
Kansas Creek	81CX21	63 51 30	147 30 00	st (300 ppm Pb)	19.166	15.692	39.044
Sheep Creek	81CX17	63 55 10	148 16 50	(500 ppm Pb)	18.858	15.706	38.985
Sheep Creek	DDH1:210	63 55	148 18	gn, sl, py, cp (2000 ppm Pb)			
Healy Creek	HC-2	63 49 05	148 16 15	GN, py	18.692	15.687	38.718
Glory Creek	GC-1	63 50 35	147 30 35	GN, sl, cp, py	19.407	15.683	39.157

Table 4. Pb-isotope data from sulfides from Southern Alaska (cont.)

Analyst	Sample Source	Deposit Characteristics: host rock	structure	texture	Deposit Type	Model No.	USBM Region/ District	TST	Age of Host	Age of Min.	Contr.	Publ. Pb Ref.
MD	M	m/sd-hstd		massive	K-VMS	28a	CR/Pw	CG	K	K	SN	
MD	M	m/sd-hstd	shear zn	opn-sp fil	mAu-V	36a	CR/Pw	CG	Te		RG	
MD	M	m/sd-hstd	shear zn	opn-sp fil	mAu-V	36a	CR/Pw	CG	Te		RG	
MD	M	m/sd-hstd	shear zn	opn-sp fil	mAu-V	36a	CR/Pw	CG	Te		RG	
	P	carb-hstd	breccia	dissem			CR/Nz		M-lTr		CH	
MD/BD	O	granite		vein	Pm-Sn MTV	20b	YR/Kn	YT			BR	
MD/BD	O	granite		vein	Pm-Sn MTV	20b	YR/Kn	YT			BR	
	O	dunite		qz vein	FV		CS/Yn	MY		36 Ma	SN	
	O	m/sd-hstd	stratiform	massive	C-VMS	24a	KR/Mg	DL	lD	lD	BR	
	P	carb-hstd		replac	Cu skn	18b	CS/Yn	MY		65 Ma	CH	
	C	granite	stockwork	qz vein	Greisen	15c	CS/Vl	WF	52 Ma	52 Ma	NG	
	Q	grndiorite		vein	Porp	21a	YR/Cc	WR	J	J	WN/IL	
	O	carb-hstd	contact	replac	Cu skn	18b	YR/Cs	Cz	lTr	K?	WN/IL	
	C	qtz diorite	stockwork	dissem	Porp	21a	YR/Cs	Cz	K	105 Ma	DGGS	
	C	grndiorite	stockwork	dissem	Porp	21a	YR/Cs	Cz	P	K	DGGS	
MD	D	granite	breccia	qz vein	Pm-MTV	22c	YR/Kn	YT	K	K	HK	
	C	m/sd-hstd	breccia	qz vein	Pm-MTV	22c	YR/Kn	YT	Pz?	K	DGGS	
	C	m/sd-hstd	breccia	qz vein	Pm-MTV	22c	YR/Kn	YT	Pz?	K	DGGS	
	C	m/sd-hstd	breccia	qz vein	Pm-MTV	22c	YR/Kn	YT	Pz?	K	DGGS	
	C	m/sd-hstd	breccia	qz vein	Pm-MTV	22c	YR/Kn	YT	Pz?	K	DGGS	
	C	m/sd-hstd	breccia	qz vein	Pm-MTV	22c	YR/Kn	YT	Pz?	K	DGGS	
MD/BD	O	mvol-hstd	stratiform		K-VMS	28a	YR/Bf	YT	D-M	D-M	JK	87.3
MD	O	mvol-hstd	stratiform		K-VMS	28a	YR/Bf	YT	D-M	D-M	JK	87.3
MD	R	mvol-hstd	stratiform	massive	K-VMS	28a	YR/Bf	YT	D-M	D-M	JK	87.3
MD	O	mvol-hstd	stratiform	massive	K-VMS	28a	YR/Bf	YT	D-M	D-M	JK	87.3
MD/BD	O	mvol-hstd	stratiform		K-VMS	28a	YR/Bf	YT	D	D	JK	87.3
MD	O	m/sd-hstd	stratiform		K-VMS	28a	YR/Bf	YT	M	M	JK	87.3
MD	O	m/sd-hstd	crs-cuting	vein	Pm-MTV	22c	YR/Bf	YT	D-M	71 Ma	DC	87.3
MD	O	mvol-hstd			K-VMS	28a	YR/Bf	YT	D-M	D-M	DC	87.3
	C	mvol-hstd	stratiform	massive	K-VMS	28a	YR/Bf	YT	D-M	D-M	JH	
MD	O	m/sd-hstd			K-VMS	28a	YR/Bf	YT	D-M	D-M	SC	87.3
MD	P	granite		vein	Pm-MTV	22c	YR/Bf	YT	K-T	K-T	SC	87.3

Table 4. Pb-isotope data from sulfides from Southern Alaska (cont.)

QUADRANGLE Locality Name	Sample No.	Latitude	Longitude	Sample Mineralogy	$^{206}Pb/^{204}Pb$	$^{207}Pb/^{204}Pb$	$^{208}Pb/^{204}Pb$
HEALY (cont.)							
West Fork Glacier	79CQ48	63 28 24	147 35 15	(200 ppm Pb)	18.779	15.663	38.667
Golden Zone	81CX1-3	63 12 50	149 38 40	(100 ppm Pb)	19.151	15.602	38.687
Golden Zone	HKD-1,2	63 12 50	149 38 40				
Ohio Creek	81CX5-7	63 10 55	149 54 55	(2000 ppm Pb)	19.151	15.632	38.733
North Carolina	81CX-10	63 06 10	149 24 50	st (150 ppm Pb)	19.020	15.642	38.761
L. Honolulu Creek	81CX-12	63 02 00	149 29 00	(1000 ppm Pb)	19.031	15.605	38.597
Honolulu porphyry	DDH1:66.8	63 02 00	149 29 00	GN			
Denali Copper	79AIL088A	63 08 10	147 08 20	cp, py (70 ppm Pb)	18.886	15.570	38.461
MOUNT HAYES							
Trio	81AIL140A	63 15 53	144 02 18	GN	18.834	15.692	38.748
DDY	81AIL162A	63 15 32	144 14 20	GN	18.896	15.716	38.779
LP-PP2	81ANK184B	63 14 22	144 07 00	gn (700 ppm Pb)	18.931	15.726	38.899
Trio	81AIL126C	63 15 44	144 02 02	GN	18.886	15.719	38.839
DDN	80AIL028A	63 16 31	144 16 23	gn (200 ppm Pb)	18.911	15.729	38.828
Rumble Creek	RC	63 14 22	144 10 00	cp, py, GN	18.672	15.690	38.663
Lam. Zn. N. Cirque	LZ-U	63 10 46	144 08 55	GN, sl, cp	18.645	15.681	38.630
Discovery Zn-PPD	PPD	63 08 30	144 02 36	GN, sl, cp	18.666	15.674	38.600
Roberts #1	82AIL044A	63 35 59	146 14 48	(500 ppm Pb)	18.889	15.691	38.670
Miyaoka	82AIL052A	63 41 20	146 39 34	(50 ppm Pb)	18.985	15.716	38.872
Rainy Creek	79AIL019B	63 19 13	145 57 48	(30 ppm Pb)	18.720	15.569	38.196
Rainy Creek	79AIL019E	63 19 13	145 57 48	(35 ppm Pb)	18.744	15.577	38.213
Ann Creek	79AIL091B	63 20 24	145 46 34	py, po (20 ppm Pb)	18.848	15.591	38.408
W. Fork, Chistochina R.	79AIL069B	63 11 01	144 58 24	po, py (85 ppm Pb)	18.986	15.610	38.383
E. Fork, Broxson Gulch	79AIL030A	63 21 00	146 02 40	py, cp, po (25 ppm Pb)			
E. Fork, Broxson Gulch	79AIL030B	63 21 00	146 02 40	py, cp, po (30 ppm Pb)			
E. Fork, Broxson Gulch	79AIL030C	63 21 00	146 02 40	py, cp, po (30 ppm Pb)			
E. Fork, Broxson Gulch	79AIL030E	63 21 00	146 02 40	py, cp, po (25 ppm Pb)			
W. Delta River	79AIL092D	63 20 25	145 46 43	cp, po (30 ppm Pb)			
W. Delta River	79AIL092E	63 20 25	145 46 43	cp, po (30 ppm Pb)			
Eastern Star	79AIL012A	63 18 52	145 59 05	py, cp (10 ppm Pb)			
Eastern Star	79AIL012C	63 18 52	145 59 05	py, cp (10 ppm Pb)			
North Rainbow Mtn	79AIL024A	62 20 52	145 42 24	py (60 ppm Pb)			
Cantwell Glacier	79AIL081A	63 21 07	145 39 29	po, cp (30 ppm Pb)			
Paxson Mtn	79AIL059A	63 02 14	145 33 44	cp, bn, az, ml (20 ppm Pb)			
Miller Creek	85AIL019A	63 21 00	145 41 10	po			
Miller Creek	85AIL018A	63 21 22	145 41 58	po			
Miller Creek	85AIL018B	63 21 22	145 41 58	po			
Kathleen Margaret Vein	79AIL038D	63 17 00	146 33 04	(70 ppm Pb)	18.724	15.565	38.369
Zackly	85AIL037A	63 13 00	146 41 40	py, cp, bn, cc, mly, hm			
Zackly	85AIL036A	63 13 10	146 41 54	py, cp, bn, cc, mly, hm			
Zackly	85AIL035A	63 13 12	146 42 12	cp, bn, cc, mly, hm			

Table 4. Pb-isotope data from sulfides from Southern Alaska (cont.)

Analyst	Sample Source	Deposit Characteristics: host rock	structure	texture	Deposit Type	Model No.	USBM Region/ District	TST	Age of Host	Age of Min.	Contr.	Publ. Pb Ref.
MD	0	carb-hstd		replac	Fe skn	18d	CS/Vl	MK	Tr	K?	DC	87.3
MD	0	granite	breccia	vein	Porp	21a	CS/Vl	CH		60 Ma	DC	
	0	grndiorite	breccia	vein	Porp	21a	CS/Vl	CH		60 Ma	HK	
MD	0	m/sd-hstd		vein	Greisen	15c	CS/Vl	CH	K-J	60 Ma	DC	
MD	0	m/sd-hstd	crs-cuting	vein	Pm-Sn MTV	20b	CS/Vl	BP	K-J	T?	DC	
MD	0	granite	crs-cuting	vein	Pm-Sn MTV	20b	CS/Vl	BP	Te	53 Ma	DC	
	C	granite	stockwork	dissem	Porp	20a	CS/Vl	BP	Te	53 Ma	CH	
ALH	0	basalt	stratiform	massive	Ba Cu	23	CS/Vl	WR	Tr	Tr	IL	
ALH	0	mvol-hstd	stratiform		K-VMS	28a	YR/Tk	YT/Jc			WN/IL	87.3
ALH	0	mvol-hstd	stratiform		K-VMS	28a	YR/Tk	YT/Jc			WN/IL	87.3
ALH	0	mvol-hstd	stratiform		K-VMS	28a	YR/Tk	YT/Jc			WN/IL	87.3
ALH	0	mvol-hstd	stratiform		K-VMS	28a	YR/Tk	YT/Jc			WN/IL	87.3
ALH	0	mvol-hstd	stratiform		K-VMS	28a	YR/Tk	YT/Jc			WN/IL	87.3
MD	R	mvol-hstd	stratiform		K-VMS	28a	YR/Tk	YT/Jc	D	D	JK	87.3
MD	0	mvol-hstd	stratiform		K-VMS	28a	YR/Tk	YT/Jc			SLC	87.3
MD	0	mvol-hstd	stratiform		K-VMS	28a	YR/Tk	YT/Jc			SLC	87.3
ALH	0	mvol-hstd	stratiform		K-VMS	28a	YR/Bf	YT/Hg			WN/IL	
ALH	0	mvol-hstd	stratiform		K-VMS	28a	YR/Bf	YT/Hg			WN/IL	
ALH	0	carb-hstd	contact	replac	skn	18?	YR/Dr	WR/Sr	lPz		WN/IL	
ALH	0	carb-hstd	contact	replac	skn	18?	YR/Dr	WR/Sr	lPz		WN/IL	
ALH	0	mvol-hstd		qz vein	Pm MTV	22c	CS/Vl	WR/Sr	Tr		WN/IL	
ALH	0	grndiorite		massive	Porp	21a	CS/Cc	WR/Sr			WN/IL	
	0	gabbro	podiform	cumulate	Stwtr	1	YR/Dr	WR/Sr	Tr	Tr	WN/IL	
	0	gabbro	podiform	cumulate	Stwtr	1	YR/Dr	WR/Sr	Tr	Tr	WN/IL	
	0	gabbro	podiform	cumulate	Stwtr	1	YR/Dr	WR/Sr	Tr	Tr	WN/IL	
	0	gabbro	podiform	cumulate	Stwtr	1	YR/Dr	WR/Sr	Tr	Tr	WN/IL	
	0	gabbro	shear zn	vein	Stwtr	1	YR/Dr	WR/Sr	Tr	Tr	WN/IL	
	0	gabbro	shear zn	vein	Stwtr	1	YR/Dr	WR/Sr	Tr	Tr	WN/IL	
	0	diorite	lens	dissem	Porp	21a	YR/Dr	WR/Sr	J-K	J-K	WN/IL	
	0	diotite	lens	dissem	Porp	21a	YR/Dr	WR/Sr	J-K	J-K	WN/IL	
	0	m/sd-hstd	shear zn	qz vein	mV		YR/Dr	WR/Sr	lP-P	K?	WN/IL	
	0	qz diorite	stockwork	qz vein	Porp	21a	YR/Dr	WR/Sr	J-K	J-K	WN/IL	
	0	volc-hstd		qz vein	mV		CS/Cc	WR/Tg	Tr	K?	WN/IL	
	0	serpentine	lens	vein	Stwtr	1	YR/Dr	WR/Tg	Tr	Tr	WN/IL	
	0	serpentine	lens	vein	Stwtr	1	YR/Dr	WR/Tg	Tr	Tr	WN/IL	
	0	serpentine	lens	vein	Stwtr	1	YR/Dr	WR/Tg	Tr	Tr	WN/IL	
ALH	0	mvol-hstd	crs-cuting	qz vein	mV		CS/Vl	WR/Tg	Tr	K?	WN/IL	
	0	carb-hstd	contact	replac	Cu skn	18b	CS/Vl	WR/Tg	K	125 Ma	WN/IL	
	0	carb-hstd	contact	replac	Cu skn	18b	CS/Vl	WR/Tg	K	125 Ma	WN/IL	
	0	carb-hstd	contact	replac	Cu skn	18b	CS/Vl	WR/Tg	K	125 Ma	WN/IL	

Table 5. Pb-isotope data from sulfides from Southwestern Alaska

QUADRANGLE Locality Name	Sample No.	Latitude	Longitude	Sample Mineralogy	$^{206}Pb/^{204}Pb$	$^{207}Pb/^{204}Pb$	$^{208}Pb/^{204}Pb$
PORT MOLLER							
Apollo Mine	PMF089R2	55 11 37	160 33 20	GN			
Susie adit	82AWS50A	55 17 28	160 28 25	cp, sl, py (10000 ppm Pb)			
Pyramid	83ADT118	55 37 49	160 44 19	(300 ppm Pb)			
Moss Cape	83AJM607	55 08 38	161 57 35	(100 ppm Pb)			
PM C-4	84AYB671A	55 36 24	161 05 57	py (100 ppm Pb)			
Mud Bay	85AWS281C	55 43 46	160 30 47	GN			
STEPOVAK BAY							
Mitrofania Island	84AGE11C	55 50 58	158 52 54	(300 ppm Pb)			
SB C-5	83AWS86B	55 42 14	159 32 53	(100 ppm Pb)			
CHIGNIK							
Warner Bay	77AWS87A	56 09 40	158 24 15	GN, cp, sl, mly	18.894	15.544	38.398
Bee Creek	many	56 30	158 24	cp, mly, py, gn, asp			
Chignik A-2	83AWS57C	56 00 03	158 38 16	(1500 ppm Pb)			
UGASHIK							
Rex	79CE40	57 14 23	157 02 35	GN, py, mly (140 ppm Pb)	18.909	15.594	38.522
Rex	Ug86018	57 14 10	157 04 35	GN, sl (300 ppm Pb)			
Mike	79DT45B	57 03 07	157 15 24	py, mly (50 ppm Pb)			
Mike	Ug86031	57 03 00	157 16 15	asp, sl (100 ppm Pb)			
Kilokak Cape	80CE154	57 11 20	156 20 11	(200 ppm Pb)	18.140	15.584	37.851
David Island	Ug86005	57 01 35	156 29 27	py (50 pm Pb)			
KARLUK							
Cape Kubugakli	Ug86001	57 53 15	155 04 15	tt (50 ppm Pb)			
MOUNT KATMAI							
Mt. Griggs	K3408RD	58 19 11	155 00 05	GN, py, sl, tt			
Walatka Mtns	K3505RC	58 53 23	154 58 25	GN, py, cp, ep (30 ppm Pb)			
Kulik Lake	K4574RA	58 56 32	154 45 50	py, tt (300 ppm Pb)			
Margot Creek	K3414CM	58 16 13	155 26 27	GN (300 ppm Pb)			
Cape Douglas	K3604RB	58 40 55	153 52 15	py, sl, gn (200 ppm Pb)			
KL Prospect	K3607RB	58 54 12	154 53 20	py, gn, sl (200 ppm Pb)			
KL Prospect	K3608RB	58 54 21	154 54 12	py, gn, sl (300 ppm Pb)			
KL skarn	K3610RD	58 49 09	154 53 20	sl, asp, gn (300 ppm Pb)			
ILIAMNA							
Battle Lake	K4100RA	59 06 30	154 52 30	bn, ch, lm (500 ppm Pb)			
Paint River/Crevice Crk	DDH1:193	59 08 30	154 39 00	sl, GN			
McNeil Prospect	K3606RC	59 08 30	154 39 00	cp, py, asp, sl, gn (200 ppm Pb)			
LAKE CLARK							
Glacier Fork	LC-16F	60 51	153 14	cp, sl			
Kasna Creek	LC-46	60 10	154 03 30	mt, cp, hm, gt, px			
Redoubt volcano		60 28 48	152 45				
dacite, 1st unit	482Q	60 32 50	152 43 20	rock	18.676	15.562	38.277
basalt, 2nd unit	111I	60 30 17	152 46 40	rock	18.735	15.508	38.251
dacite, 1966-68 erupt.	111J	60 30 17	152 46 40	rock	18.703	15.559	38.305
bas-andsite, 3rd unit	133A	60 32 37	152 47 01	rock	18.807	15.596	38.455

Table 5. Pb-isotope data from sulfides from Southwestern Alaska (cont.)

Analyst	Sample Source	Deposit Characteristics: host rock	structure	texture	Deposit Type	Model No.	USBM Region/ District	TST	Age of Host	Age of Min.	Contr.	Publ. Pb Ref.
	M	volc-hstd	crs-cuting	vein	FV		AP	Cz	To	To?/Tm?	JF	
	D	volc-hstd	crs-cuting	vein	FV		AP	Cz	To	To?	FW	
	O	sd-hstd	crs-cuting	qz vein	Porp	21a	AP	Cz	K-Te	6 Ma	FW	
	O	volc-hstd	crs-cuting	qz vein	Pm-MTV	22c	AP	Cz	Tm	3 Ma	FW	
	O	volc-hstd	crs-cuting	qz vein	FV		AP	Cz	Cz	Tp/Q?	FW	
	O	sd-hstd	crs-cuting	qz vein	Pm-MTV	22c	AP	Cz	Tm	Tm	FW	
	O	volc-hstd	crs-cuting	qz vein	Pm-MTV	22c	AP	Cz	Tm	6-10 Ma	FW	
	O	volc-hstd	shear zn	opn-sp fil	FV	22c	AP	Cz	To	To?/Tm?	FW	
ALH/BD	O	sd-hstd	breccia	vein	Porp	21a	AP	Cz	J	6-7 Ma	FW	83.4
	C	diorite	stockwork	dissem	Porp	21a	AP	Cz	J	3.5 Ma	JH/FW	
	O	sd-hstd	crs-cuting	qz vein	Porp	21a	AP	Cz	J	6-10 Ma	FW	
MD	O	grndiorite	stockwork	veinlet	Porp	21a	AP	Cz	K-Te	34-38 Ma	SC	
	O	grndiorite	stockwork	veinlet	Porp	21a	AP	Cz	K-Te	34-38 Ma	SC	
	O	granite	stockwork	veinlet	L-F Mo	21b	AP	Cz	K	2 Ma	SC	
	O	granite	stockwork	veinlet	L-F Mo	21b	AP	Cz	K	2 Ma	SC	
MD	O	sd-hstd	crs-cuting	vein	FV		AP	PE	J	30 Ma	SC	
	O	volc-hstd	lens	massive			AP	Cz	Cz	3-5 Ma	SC	
	O	grndiorite	shear zn	opn-sp fil	FV		BB	Cz	Tm	15 Ma	SC	
	R	grndiorite		vein	Porp	21a	BB	Cz	Cz		SC	
	O	qtz diorite	magmatic	dissem	Porp	21a?	BB	PE	J		SC	
	R	volc-hstd		vein	FV		BB	Cz			SC	
	O	grndiorite		dissem	Porp	21a	BB	Cz			SC	
	O	grndiorite	stringers	qz vein	Porp	21a	BB	Cz			SC	
	O	grndiorite	stringers	opn-sp fil	Porp	21a	BB	Cz			SC	
	P	m/sd-hstd	crs-cuting	qz vein			BB	Cz			SC	
	O	m/sd-hstd		replac	Cu-skn	18b	BB	Cz	J		SC	
	P	volc-hstd	shear zn	qz vein	FV		BB	Cz			CH	
	C	sd-hstd	crs-cuting	qz vein	Cu skn	18b	BB	Cz	J		SC	
	P	sd-hstd	lens	replac	Cu skn	18b	BB	Cz	J		SC	
	O	carb-hstd	contact	replac	Cu skn	18b	BB	KH	Tr	K	DC	
	O	carb-hstd	contact	replac	Cu skn	18b	BB	KH	Tr	K	DC	
MB	O	0.7042							0.88 Ma			83.2
MB	O	0.7040										83.2
MB	O	0.7046							1966-68 erp (?)			83.2
MB	O	0.7042										83.2

Table 6. Pb-isotope data from sulfides from Southeastern Alaska

QUADRANGLE Locality Name	Sample No.	Latitude	Longitude	Sample Mineralogy	$^{206}Pb/^{204}Pb$	$^{207}Pb/^{204}Pb$	$^{208}Pb/^{204}Pb$
CRAIG							
Moonshine	84ASh50	55 10 24	132 22 55	GN, cr			
KETCHIKAN							
Hyder (Lead?)	C-146			GN	(19.33)	(15.64)	(38.93)
Ketchikan (Copper?)	C-108			GN	(18.95)	(15.89)	(39.35)
PETERSBURG							
St Johns Harbor	79DG102E	56 25 07	132 57 13	py, cp, sl, gn			
Kupreanof Island	79DG135A	56 40 18	133 15 25	py, sl, GN, bar			
Helen S	79DG132A	56 34 11	133 04 03	sl, GN, py, asp			
Taylor Creek	79DG136A	56 47 38	133 21 45	py, GN, sl			
Glacier Basin	80DG0102	56 29	132 01	GN, flu			
Zarembo Quarry	79DG073F	56 22 56	132 53 53	GN, py, cp, sl			
Salmon Bay	79DG070A	56 19 12	133 10 06	GN, REE & U, Th-rich min.			
Maid of Mexico	79DG141A	56 33 54	133 01 57	GN, sl			
SITKA							
Pyrola	83EW053C	57 57 50	134 33 05	py, cp (700 ppm Pb)	18.568	15.603	38.299
Pyrola	PYR-1	57 57 50	134 33 05	py, cp	18.520	15.570	38.224
Patty	DDH1:110	57 33 30	134 03 20	GN			
Patty	DDH2:50,67	57 33 30	134 03 20	py, cp			
Patty	DDH2:110	57 33 30	134 03 20	GN			
Pybus	DDH2:245	57 24	134 13 30	py, cp			
SUMDUM							
Sweetheart Ridge	SW-4	57 55 25	133 37 15	sl, cp, GN	18.871	15.656	38.514
Sweetheart Ridge	AHSR-7	57 55 25	133 37 15	sl, cp, GN	18.882	15.662	38.571
Sweetheart Ridge	HSR80-1	57 55 25	133 37 15	sl, cp, GN	18.963	15.671	38.646
Point Astley	G7AHx	57 42 25	133 37 25	py, sl, gn, po, cp, cc, cv			

Table 6. Pb-isotope data from sulfides from Southeastern Alaska (cont.)

Analyst	Sample Source	Deposit Characteristics: host rock	structure	texture	Deposit Type	Model No.	USBM Region/ District	TST	Age of Host	Age of Min.	Contr.	Publ. Pb Ref.
	O	carb-hstd			Pb-Sn skn	18c	SE/Kt				DG	
		m/sd-hstd	crs-cuting	vein			SE/Hy			K?		60.1
		m/sd-hstd	dissem				SE/Kt					60.1
MD	O	volc-hstd	lens	massive	K-VMS	28a	SE/Pb	AXA	lTr	lTr	DG	
MD	O	volc-hstd	stratiform	massive	K-VMS	28a	SE/Kp	AXA	lTr	lTr	DG	
MD	D	mvol-hstd	stratabound	dissem	K-VMS	28a	SE/Kp	AXA	lTr	lTr	DG	
MD	O	m/sd-hstd	stratiform	dissem	K-VMS	28a	SE/Kp	AXA			DG	
MD	O	granite		qz vein	Pm-MTV	28a	SE/Pb	AXA	T	Cz	DG	
MD	Q	m/sd-hstd	crs-cuting	qz vein	K-VMS?	28a	SE/Pb	AXA	lTr	lTr	DG	
MD	O	alk-granite	crs-cuting	ca vein	MTV	22c	SE/Kt	AXA			DG	
MD	D	m/sd-hstd	crs-cuting	qz vein	K-VMS?	28a	SE/Kp	AXA	lTr	lTr	DG	
MD	O	m/sd-hstd	stratiform	dissem	K-VMS	28a	SE/Ad	AXA			DB	
TD		m/sd-hstd	stratiform	dissem	K-VMS	28a	SE/Ad	AXA				84.1
	C	m/sd-hstd	crs-cuting	vein	K-VMS	28a	SE/Ad	AXA			DGGS	
	C	m/sd-hstd		dissem	K-VMS	28a	SE/Ad	AXA			DGGS	
	C	m/sd-hstd	crs-cuting	vein	K-VMS	28a	SE/Ad	AXA			DGGS	
	C	m/sd-hstd		massive	K-VMS	28a	SE/Ad	AXA			DGGS	
ALH/BD	O	mvol-hstd	stratabound	massive	K-VMS	28a	SE/Ju	TU			DB	
ALH/BD	O	mvol-hstd	stratabound	dissem	K-VMS	28a	SE/Ju	TU			DB	
ALH/BD	O	m/sd-hstd	concordant	dissem	K-VMS	28a	SE/Ju	TU			DB	
	O	m/sd-htsd	stratabound	dissem	VMS	28a	SE/Pb	TU	Tr?	Tr?	CH	

Table 6. Pb-isotope data from sulfides from Southeastern Alaska (cont.)

QUADRANGLE Locality Name	Sample No.	Latitude	Longitude	Sample Mineralogy	$^{206}Pb/^{204}Pb$	$^{207}Pb/^{204}Pb$	$^{208}Pb/^{204}Pb$
JUNEAU							
Alaska Juneau Mine							
South Pit	79GD-1	58 18 30	134 21	GN	19.572	15.687	38.898
South Pit	AJSP-3	58 18 30	134 21	GN	19.539	15.655	38.775
South Pit	AJ-3759	58 18 30	134 21	GN	19.544	15.646	38.724
Level 4, 400 Stope	AJ-3756	58 18 30	134 21	GN	19.558	15.662	38.819
Level 4, 400 Stope	AJ-3757	58 18 30	134 21	GN			
Level 4, 400 Stope	AJ-3758	58 18 30	134 21	GN			
L-6 Silver Bow fault	AJ-3851	58 18 30	134 21	GN			
Level 6, 91 Winze	AJ-3852	58 18 30	134 21	GN			
Level 6, 800 Stope	AJ-3853	58 18 30	134 21	GN			
Level 7, 800 Stope	AJ-3898	58 18 30	134 21	GN			
Level 7, 830 Stope	AJ-3847	58 18 30	134 21	GN			
Level 8, 53 Winze	AJ-3845	58 18 30	134 21	GN	19.553	15.674	38.820
Level 8, 1000 Stope	AJ-3846	58 18 30	134 21	GN	19.553	15.676	38.845
Level 9, 1010 Stope	AJ-3844	58 18 30	134 21	GN	19.578	15.685	38.862
Ascension	I-3763	58 16 52	134 18 38	GN	19.513	15.667	38.854
Ascension	I-3764	58 16 52	134 18 38	GN			
Ground Hog	GH-3671	58 15	134 20	GN	19.545	15.663	38.796
Ground Hog	GH-3672	58 15	134 20	GN			
Reagan	R-3766	58 16 30	134 16 50	GN			
Perseverance	P-3670	58 18	134 20	GN	19.535	15.650	38.748
Glacier Mine	GM-3765	58 17 10	134 18 50	GN			
Treadwell	JA0143R9	58 15 42	134 22 10	cp, py	18.554	15.537	38.113
Savage	JA0124R	58 51 40	135 05 20	GN	18.898	15.579	38.299
Greens Creek	PS-27:660	58 04	134 37	cp, gn	18.670	15.610	38.449
Greens Creek	83DB103	58 04	134 37	cp, gn, py			
Alaska Treasure	AT-1	58 13 20	134 19 30	py, cp, gn, sl			
SKAGWAY							
Mt. Henry Clay	83DB110A	59 22	136 25	sl, py, cp	18.924	15.589	38.281
Mt. Henry Clay	DY 3043	59 22	136 25		18.822	15.590	38.300
Glacier Creek	GLC-1	59 24	136 23	py, cp, tt, mt, sl, gn	18.417	15.421	38.049

Table 6. Pb-isotope data from sulfides from Southeastern Alaska (cont.)

Analyst	Sample Source	Deposit Characteristics: host rock	structure	texture	Deposit Type	Model No.	USBM Region/ District	TST	Age of Host	Age of Min.	Contr.	Publ. Pb Ref.
HS/BD	M	m/sd-hstd	crs-cuting	qz vein	mAu-V	36a	SE/Ju	TU	lTr	Ta-Te	DG	
KM	M	m/sd-hstd	crs-cuting	qz vein	mAu-V	36a	SE/Ju	TU	lTr	Ta-Te	TL	
KM	M	m/sd-hstd	crs-cuting	qz vein	mAu-V	36a	SE/Ju	TU	lTr	Ta-Te	ER	
KM	M	m/sd-hstd	crs-cuting	qz vein	mAu-V	36a	SE/Ju	TU	lTr	Ta-Te	ER	
	M	m/sd-hstd	crs-cuting	qz vein	mAu-V	36a	SE/Ju	TU	lTr	Ta-Te	ER	
	M	m/sd-hstd	crs-cuting	qz vein	mAu-V	36a	SE/Ju	TU	lTr	Ta-Te	ER	
	M	m/sd-hstd	shear zn	qz vein	mAu-V	36a	SE/Ju	TU	lTr	Ta-Te	ER	
	M	m/sd-hstd	crs-cuting	qz vein	mAu-V	36a	SE/Ju	TU	lTr	Ta-Te	ER	
	M	m/sd-hstd	crs-cuting	qz vein	mAu-V	36a	SE/Ju	TU	lTr	Ta-Te	ER	
	M	m/sd-hstd	crs-cuting	qz vein	mAu-V	36a	SE/Ju	TU	lTr	Ta-Te	ER	
	M	m/sd-hstd	crs-cuting	qz vein	mAu-V	36a	SE/Ju	TU	lTr	Ta-Te	ER	
KM	M	m/sd-hstd	crs-cuting	qz vein	mAu-V	36a	SE/Ju	TU	lTr	Ta-Te	ER	
KM	M	m/sd-hstd	crs-cuting	qz vein	mAu-V	36a	SE/Ju	TU	lTr	Ta-Te	ER	
KM	M	m/sd-hstd	crs-cuting	qz vein	mAu-V	36a	SE/Ju	TU	lTr	Ta-Te	ER	
KM	M	m/sd-hstd	concordant	qz vein	mAu-V	36a	SE/Ju	TU	lTr	eCz?	ER	
	M	m/sd-hstd	concordant	qz vein	mAu-V	36a	SE/Ju	TU	lTr	eCz?	ER	
KM	M	m/sd-hstd	crs-cuting	qz vein	mAu-V	36a	SE/Ju	TU	lTr	eCz?	ER	
	M	m/sd-hstd	crs-cuting	qz vein	mAu-V	36a	SE/Ju	TU	lTr	eCz?	ER	
	M	m/sd-hstd	crs-cuting	qz vein	mAu-V	36a	SE/Ju	TU	lTr	eCz?	ER	
KM	M	m/sd-hstd	crs-cuting	qz vein	mAu-V	36a	SE/Ju	TU	lTr	eCz?	ER	
	M	m/sd-hstd	concordant	qz vein	mAu-V	36a	SE/Ju	TU	lTr	eCz?	ER	
MD	O	m/sd-hstd	crs-cuting	qz vein	mAu-V	36a	SE/Ju	TU	lTr	lK-eCz	TL	
MD	P	m/sd-hstd	crs-cuting	qz vein	mAu-V	36a	SE/Ju	TU	lTr	lK-eCz	TL	
ALH/BD	M	volc-hstd	stratiform	massive	K-VMS	28a	SE/Ad	AXA	P-Tr	P-Tr	DG	
	M	volc-hstd	stratiform	massive	K-VMS	28a	SE/Ad	AXA	P-Tr	P-Tr	DB	
	P	m/sd-hstd	stratabound	dissem	K-VMS	28a	SE/Ju	GN	JK	JK	DB/TL	
MD	R	m/sd-hstd	stratabound	massive	K-VMS	28a	SE/Ad	AXC			DB	
CGS		m/sd-hstd	stratabound		K-VMS	28a	SE/Ad	AXC				
TD		vol-hstd	stratiform	massive	K-VMS	28a	SE/Ad	AXC	lTr	lTr		84.1

Pb-isotope Bibliography for Alaska

1960

1) Russell, R. D. and Farquar, R. M., 1960, Lead Isotopes in Geology. Intersciences Publishers, Inc., New York, 243 p.

1970

1) Doe, B. R., 1970, Lead Isotopes. Springer-Verlag, New York, 137 p.

1978

1) Kay, R. W., Sun, S.-S. and Lee-Hu, C.-N., 1978, Pb and Sr isotopes in volcanic rocks from Aleutian Islands and Pribilof Islands, Alaska: Geochimica Cosmochimica Acta, v. 42, p. 263-273.

1979

1) Doe, B. R. and Zartman, R. E., 1979, Plumbotectonics, the Phanerozoic, in H. L. Barnes, ed., Geochemistry of Hydrothermal Ore Deposits, 2nd ed., Wiley and Sons, New York, pp. 22-70.

1980

1) Lueck, L. L., 1980, Lead isotope ratios from the Red Dog and Drenchwater Creek lead-zinc deposits, DeLong Mountains, Brooks Range, Alaska: Short Notes on Alaskan Geology 1979-1980, Alaska Division Geological and Geophysical Surveys, Geologic Report 63, p. 1-5.

1982

1) Hitzman, M. W., Smith, T. E., and Proffett, J. M., 1982, Bedrock geology of the Ambler district, southwestern Brooks Range, Alaska: Alaska Division Geological and Geophysical Surveys, Geologic Report 75, scale 1:125,000, 2 sheets.

1983

1) Ashworth, K. K., 1983, Genesis of gold deposits at the Little Squaw Mines, Chandalar Mining District, Alaska. Master's Thesis, University of Western Washington, Bellingham, Wa., 98 p.

2) Bevier, M. L. and Wheeler, K. R., Isotopic composition of lead and strontium in a suite of rocks from Redoubt volcano, Geological Society of America, Abstracts with Programs, v. 15, p. 331.

3) Morris, J. D. and Hart, S. R., 1983, Isotopic and incompatible element constraints on the genesis of island arc volcanics from Cold Bay and Amak Island, Aleutians, and implications for mantle structure: Geochimica Cosmochimica Acta, v. 47, p. 2015-2030.

4) Wilson, F. H. and Cox, D. P., 1983, Geochronology, geochemistry, and tectonic environment of porphyry mineralization in the central Alaska Peninsula, U. S. Geological Survey Open-File Report 83-783, 24 p.

1984

1) Van Nieuwenhuyse, U. E., 1984, Geology and Geochemistry of the Pyrola massive sulfide deposit, Admirality Island, Southeast Alaska. Master's Thesis, University of Arizona, Tempe, Az., 170 p.

1985

1) Church, S. E, Briskey, J. A., Delevaux, M. H., and LeHuray, A. P., 1985, Preliminary results of Pb-isotope analyses of deposits from the Seward Peninsula, in Bartsch-Winkler, S. and Reed, K. M., eds., The United States Geological Survey in Alaska, Accomplishments in 1984: U. S. Geological Survey Circular 967, p. 24-27.

2) Lange, I. M., Nokleberg, W. J., Plahuta, J. T., Krouse, H. R. and Doe, B. R., 1985. Geologic setting, petrology, and geochemistry of stratiform sphalerite-galena-barite deposits, Red Dog Creek, Drenchwater Creek areas, northwestern Brooks Range, Alaska. Economic Geology, v. 80, p. 1896-1926.

3) LeHuray, A. P., Church, S. E, and Nokleburg, W. J., 1985, Lead isotopes in sulfide deposits from the Jarvis Creek Glacier and Wrangellia Terranes, Mount Hayes Quadrangle, eastern

Alaska Range, in Bartsch-Winkler, S. and Reed, K. M., eds., The United States Geological Survey in Alaska, Accomplishments during 1983: U. S. Geological Survey Circular 945, p. 72-73.

4) LeHuray, A. P., Stowell, H. S., and Church, S. E, 1985, Lead isotopes from volcanogenic massive sulfide deposits from the Alexander Terrane, southeastern Alaska, in Bartsch-Winkler, S. and Reed, K. M., eds., The United States Geological Survey in Alaska, Accomplishments during 1983: U. S. Geological Survey Circular 945, p. 95-96.

5) Myers, J. D. and Sinha, A. K., 1985, A detailed Pb isotopic study of crustal contamination/assimilation: The Edgecumbe volcanic field, SE Alaska: Geochimica Cosmochimica Acta, v. 49, p. 1343-1355.

1986

1) Bernstein, L. R. and Cox, D. P., 1986, Geology and sulfide mineralogy of the number one orebody, Ruby Creek copper deposit, Alaska: Economic Geology, v. 81, p. 1675-1689.

2) Church, S. E, Lichte, F. E., and Meier, A. L., 1986, Evaluation of the ICP-MS for Pb-isotope measurements in exploration geochemistry, in Barnes, R. M., ed., Abstracts for the 1986 Winter Conference on Plasma Spectrometry, ICP Information Newsletter, v. 11, p. 47.

3) Church, S. E., Gray, J. E., Delevaux, M. H., 1986, Use of Pb-isotopic signatures for geochemical exploration in the Healy Quadrangle, Eastern Alaska Range, in Bartsch-Winkler, S. and Reed, K. M., eds., The Geological Survey in Alaska, Accomplishments during 1985: U.S. Geological Survey Circular 978, p. 38-41.

4) Gray, J. E., Church, S. E., and Delevaux, M. H., 1986, Lead-isotope results from gold-bearing quartz veins from the Valdez and Orca Groups Chugach National Forest, in Bartsch-Winkler, S. and Reed, K. M., eds, The U.S. Geological Survey in Alaska, Accomplishments during 1985: U.S. Geological Survey Circular 978, p. 45-49.

5) Gulson, B. L., 1986, Lead isotopes in mineral exploration. Elsevier, New York, 245 p.

6) Lueck, L. L., 1986, Petrologic and geochemical characterization of the Red Dog and other base-metal sulfide and barite deposits in the DeLong Mountains, western Brooks Range, Alaska. Min. Industries Res. Lab., Fairbanks, Ak., MIRL Report 71, 105 p.

1987

1) Aleinikoff, J. N., Dusel-Bacon, C., Foster, H. L., and Nokleberg, W. J., 1987, Lead-isotopic fingerprinting of tectonostratigraphic terranes, East Central Alaska, Canadian Journal Earth Sciences, in press.

2) Church, S. E., 1987, Studies of lead isotopes in sulfide deposits from accreted terranes in the North American Cordillera, in Sachs, J. S., ed., USGS Research on Mineral Resources--1987 Program and Abstracts: U. S. Geological Survey Circular 995, p. 12-13.

3) Church, S. E., Gray, J. E., Delevaux, M. H., and LeHuray, A. P., 1987, Lead-isotope signatures of Devonian-Mississippian massive sulfide deposits in Alaska and their significance to mineral exploration, in I. L. Elliott and B. W Smee, eds., Proceedings of GEOEXPO86 Symposium, Vancouver, May, 1986, in press.

4) Folger, P. F., 1987, The geology and mineralization at the Omar copper prospect, Baird Mountains, Master's Thesis, University of Montana, Missoula, Mt., 142 p.

APPENDIX I

Summary of abbreviations used in Tables 1-6

Sample Mineralogy

ank	ankerite	ang	anglesite	asp	arsenopyrite
Au	gold	az	azurite	bar	barite
bis	bismuthinite	bn	bornite	cal	calcite
cs	cassiterite	cr	cerussite	cc	chalcocite
cp	chalcopyrite	ch	chyrsocolla	cn	cinnabar
cv	covellite	dl	dolomite	ep	epidote
flu	fluorite	gn	galena	gt	garnet
hm	hematite	lm	limonite	mt	magnetite
ml	malachite	mly	molybdenite	pn	pentlandite
py	pyrite	pl	pyrolusite	px	pyroxene
po	pyrrhotite	qz	quartz	sch	scheelite
scr	scrodite	sl	sphalerite	st	stibnite
tn	tennantite	tp	topaz	tt	tetrahedrite
tu	tourmaline				

Sample source

Core	Dump	Mine	Outcrop
Prospect pit	Rubblecrop	Stream bed	Quarry

Deposit Characteristics (abbreviations underlined)

Host rock terms

Igneous rocks	Sedimentary rocks	Metamorphic rocks
dacite	carbonate-hosted	marble-hosted
diorite	conglomerate-hosted	metasediment-hosted
dunite	sediment-hosted	metavolcanic-hosted
felsic	shale-hosted	schist-hosted
gabbro	sandstone-hosted	serpentine
granodiorite		
granite		
monzonite		
ophiolite		
tonalite		

Structural terms

breccia	concordant	cross-cutting	gossan
ign. contact	lens	magmatic	podiform
shear zone	sheeted-dike	stockwork	stratabound
stratiform	stringer		

Textural terms

banded	cumulate	disseminated	massive
replacement	vein	open-space filling	

Deposit-types (after Cox and Singer, 1986)

Synonym	Model no.	Descriptive deposit names

DEPOSITS RELATED TO MAFIC AND ULTRAMAFIC INTRUSIONS

Stwtr	1	Stillwater Ni-Cu
Bush Cu	2a	Bushveld Cr
MR	2b	Mersensky Reef PGE
	3	Bushveld Fe-Ti-V
Dul Cu	5a	Duluth Cu-Ni-PGE
Nor PGE	5b	Noril'sk Cu-Ni-PGE
Komat	6a	Komatiitic Ni-Cu
UM Cu	6b	Dunitic Ni-Cu
Volc Ni	7a	Synorogenic-synvolcanic Ni-Cu
	7b	Anorthositic Ti
Pod Cr	8a	Podiform Cr
LF Co	8c	Limassol Forest Co-Ni
	8d	Serpentine-hosted asbestos
	9	Alaskan PGE

DEPOSITS RELATED TO ALKALIC INTRUSIONS

	10	Carbonatite deposits
	12	Diamond pipes

DEPOSITS RELATED TO FELSIC INTRUSIONS

W-skn	14a	W skarns
Sn-skn	14b	Sn skarns
Rep Sn	14c	Replacement Sn
W-FV	15a	W veins
Sn-FV	15b	Sn veins
Greisen	15c	Sn greisen
H-F Mo	16	Climax Mo
Porp Cu	17	Porphyry Cu
Po Cu-skn	18a	Porphyry Cu, skarn-related deposits
Cu-skn	18b	Cu skarns
Pb-Zn skn	18c	Zn-Pb skarns
Fe-skn	18d	Fe skarns
	18e	Carbonate-hosted asbestos
Replc	19a	Polymetallic replacement deposits
	19b	Replacement Mn

Porp Sn	20a	Porphyry Sn
Pm Sn MTV	20b	Sn-polymetallic veins
Po Cu-Au	20c	Porphyry Cu-Au
Porp	21a	Porphyry Cu-Mo
L-F Mo	21b	Porphyry Mo, low-F type
VH sulso	22a	Volcanic-hosted Cu-As-Sb
Pm-Te FV	22b	Au-Ag-Te veins
Pm MTV	22c	Polymetallic veins

DEPOSITS RELATED TO SUBAERIAL MAFIC EXTRUSIVE ROCKS

Bas Cu	23	Basaltic Cu

DEPOSITS RELATED TO MARINE MAFIC EXTRUSIVE ROCKS

C-VMS	24a	Cyprus massive sulfide
B-VMS	24b	Besshi massive sulfide
Vol-Mn	24c	Volcanogenic Mn
BB-Co	24d	Blackbird Co-Cu

DEPOSITS RELATED TO SUBAERIAL FELSIC TO MAFIC EXTRUSIVE ROCKS

HS-Au	25a	Hot-springs Au-Ag
Cd MTV	25b	Creede epithermal veins
Cs MTV	25c	Comstock epithermal veins
S-MTV	25d	Sado epithermal veins
QA-Au	25e	Epithermal quartz-alunite Au
	25f	Volcanogenic U
Mn-MTV	25g	Epithermal Mn
	25h	Rhyolite-hosted Sn
	25i	Volcanogenic-hosted magnetite
	26a	Carbonate-hosted Au-Ag
	27a	Hot-springs Hg
	27b	Almaden Hg
	27c	Silica-carbonate Hg
Sb-FV	27d	Sb veins
	27e	Disseminated Sb deposits

DEPOSITS RELATED TO MARINE FELSIC TO MAFIC EXTRUSIVE ROCKS

K-VMS	28a	Kuroko massive sulfides
	28b	Algoma Fe

DEPOSITS HOSTED IN CLASTIC SEDIMENTARY ROCKS

Cg-Au	29a	Quartz pebble conglomerate Au-U
OD-Cu	29b	Olympic Dam Cu-U-Au
ss Pb-Zn	30a	Sandstone-hosted Pb-Zn
sd Cu	30b	Sediment-hosted Cu
	30c	Sandstone-hosted U
SEDEX	31a	Sedimentary exhalative Zn-Pb
B Bar	31b	Bedded barite
	31c	Emerald veins

DEPOSITS HOSTED IN CARBONATE ROCKS

SEM Pb-Zn	32a	SE Missouri Pb-Zn
Apl Zn	32b	Appalachian Zn
Kip Cu	32c	Kipushi Cu-Pb-Zn

CHEMICAL-SEDIMENTARY DEPOSITS

	34a	Superior Fe
sd Mn	34b	Sedimentary Mn
	34c	Upwelling-type phosphate deposits
	34d	Warm-current-type phosphate deposits

DEPOSITS RELATED TO REGIONAL METAMORPHISM

mAu-V	36a	Low-sulfide Au-Quartz veins
Home	36b	Homestake Au
	37a	Unconformity U-Au
	37b	Au on flat faults

DEPOSITS RELATED TO SURFICIAL PROCESSES AND UNCONFORMITIES

	38a	Lateritic Ni deposits
	38b	Laterite-type bauxite deposits
	38c	Karst-type bauxite deposits
Plc Au	39a	Placer Au-PGE
	39b	Placer PGE-Au
	39c	Shoreline placer Ti
	39d	Diamond Placers
	39e	Alluvial placer Sn

U. S. Bureau of Mines (Abbreviations used, Ransome and Kerns, 1954)

AP ALASKAN PENINSULA

AI ALEUTIAN ISLANDS

BS BERING SEA

BB BRISTOL BAY

CS COOK INLET-SUSITNA RIVER
- An Anchorage
- Rd Redoubt
- Vl Valdez Creek
- Wl Willow Creek
- Yn Yentna

CR COPPER RIVER
- Cc Chistochina
- Nc Nelchina
- Nz Nizina
- Pw Prince William Sound
- Yt Yakataga

KP KENAI PENINSULA
- Hp Hope
- Hm Homer
- Sw Seward

KD KODIAK

KR KUSKOKWIM RIVER
- Ak Aniak
- Bt Bethel
- Gb Goodnews Bay
- Mg McGrath

NA NORTHERN ALASKA
- Ba Barrow
- Cn Canning
- Cv Colville
- Ls Lisburne
- Ww Wainwright

NW NORTHWESTERN ALASKA
- Ki Kiana
- Nt Noatak
- Sl Selawik
- Sh Shungnak

SP SEWARD PENINSULA

Co	Council
Fh	Fairhaven
Kg	Kougarok
Ky	Koyuk
Nm	Nome
Pc	Port Clarence
Sr	Serpentine

SE SOUTHEAST ALASKA

Ad	Admirality
Ch	Chichagof
Hy	Hyder
Ju	Juneau
Kt	Ketchikan
Kp	Kupreanof
Pb	Petersburg
Yk	Yakutat

YR YUKON RIVER

Av	Anvik
Bl	Black
Bf	Bonnifield
Ch	Chandalar
Cs	Chisana
Ci	Circle
Dr	Delta River
Ea	Eagle
Fb	Fairbanks
Fm	Fortymile
Gp	Goodpaster
Hs	Hot Springs
Hu	Hughes
Id	Iditarod
In	Innoko
Ka	Kaiyuh
Kn	Kantishna
Kk	Koyukuk
Ma	Marshall
Ml	Melozitna
Rm	Rampart
Ru	Ruby
Sj	Sheenjek
Tk	Tok
Tv	Tolovana
Yf	Yukon Flats

Tectonostratigraphic terranes (TST)

Alaska (from Jones and others, 1984; Monger and Berg, 1984)

AAC	Coldfoot subterrane of the Arctic Alaska terrane
AAD	DeLong Mountains subterrane of the Arctic Alaska terrane
AAE	Endicott Mountains subterrane of the Arctic Alaska terrane
AAH	Hammond subterrane of the Arctic Alaska terrane
AAN	North Slope subterrane of the Arctic Alaska terrane
AM	Amgayucham terrane
AX	Alexander terrane
AXA	Admirality subterrane of the Alexander terrane
AXC	Craig subterrane of the Alexander terrane
AXN	Annette subterrane of the Alexander terrane
BP	Broad Pass terrane
BR	Bridge River terrane
BRY	Baldry terrane
BV	Barkerville terrane
CC	Cache Creek terrane
CCB	Bonaparte subterrane of the Cache Creek terrane
CCF	French Range subterrane of the Cache Creek terrane
CCM	Marble Range subterrane of the Cache Creek terrane
CCN	Nakina subterrane of the Cache Creek terrane
CCP	Pavilion subterrane of the Cache Creek terrane
CCS	Sentinel subterrane of the Cache Creek terrane
CG	Chugach terrane
CH	Chulitna terrane
CK	Chilliwack terrane
CR	Crescent terrane
CW	Clearwater terrane
CZ	Crazy Mountains terrane
DL	Dillinger terrane
HZ	Hozameen terrane
GD	Goodnews terrane
IN	Innoko terrane
KA	Kandik River terrane
KG	Kagvik terrane
KH	Kahiltna terrane
KIL	Kilbuck terrane
KK	Kachimak terrane
KL	Kluane terrane
KO	Kootenay terrane
KY	Koyukuk terrane
LG	Livengood terrane
MAN	Manley terrane
MD	McLeod terrane
MK	McKinley terrane
ML	MacLaren terrane
MO	Monashee terrane
MN	Minchumina terrane
MNK	Minook terrane
MT	Methow-Tyaughton terrane

MY	Mystic terrane
NK	Nooksack terrane
NN	Nenana terrane
NX	Nixon terrane
NY	Nyack terrane
PC	Porcupine terrane
PE	Peninsular terrane
PN	Pingston terrane
PW	Prince William terrane
QN	Quesnellia terrane
QNR	Harper River subterrane of the Quesnellia terrane
QNO	Okanagan subterrane of the Quesnellia terrane
RB	Ruby terrane
SD	Seward terrane
SE	Saint Elias terrane
SH	Shuksan terrane
SHE	Sheenjek terrane
SK	Skagit terrane
SM	Slide Mountain terrane
ST	Stikinia terrane
SU	Sustina terrane
SV	Seventymile terrane
TA	Tracy Arm terrane
TG	Togiak terrane
TK	Tikchik terrane
TU	Taku terrane
TZ	Tozitna terrane
VEN	Venetie terrane
WC	Woodchopper Canyon terrane
WF	West Fork terrane
WHM	White Mountains terrane
WM	Windy-McKinley terrane
WR	Wrangellia terrane
WS	Wickersham terrane
WY	Windy terrane
YA	Yakutat terrane
YO	York terrane
YT	Yukon Tanana terrane

Geologic symbols used to designate geologic ages of units or rock assemblages that are not accreted

Cz	Rocks of Cenozoic age
K	Rocks of late Cretaceous age
T	Rocks of Tertiary age
GN	Gravina-Nutzotin Belt

Abbreviations used for ages of the geologic time scale

Cz	Cenozoic (Tertiary)	0-66.4 Ma
Tq	Quaternary	1.6 Ma
Tp	Pliocene	5.3 Ma
Tm	Miocene	23.7 Ma
To	Oligocene	36.6 Ma
Te	Eocene	57.8 Ma
Ta	Paleocene	66.4 Ma
Mz	Mesozoic	66.4-245 Ma
K	Cretaceous	144 Ma
J	Jurassic	208 Ma
Tr	Triassic	245 Ma
Pz	Paleozoic	245-570 Ma
P	Permian	266 Ma
IP	Pennsylvanian	320 Ma
M	Mississippian	360 Ma
D	Devonian	408 Ma
S	Silurian	438 Ma
O	Ordovician	505 Ma
C	Cambrian	570 Ma
Pc	Precambrian	>570 Ma

The time-stratigraphic terms, early (e), middle (m), and late (l), have been applied as modifiers to the age designations where the fossil data are sufficiently restrictive. Radiometric ages are used where available and are expressed in million years (Ma).

Names and addresses of analysts

MB	M. L. Bevier, Canadian Geological Survey, 601 Booth St., Ottawa, Ontario, K1A 0E8 CANADA
GC	G. L. Cumming, Dept. Geology, Univ. Alberta, Edminton, Canada
MD	M. H. Delevaux, USGS, P. O. Box 25046, MS 963, Denver, CO 80225
ALH	A. P. LeHuray, Lamont-Doherty Geol. Obs, Palisades, NY 10964
KM	K. J. Mizon, CSIRO, P. O. Box 136, North Ryde, AUSTRALIA
HS	H. J. Stein, USGS, P. O. Box 25046, MS 905, Denver, CO 80225
CGS	Ralph Thorpe, Canadian Geological Survey, 601 Booth St., Ottawa, Ontario, K1A 0E8 CANADA
	K. M. Dawson, Canadian Geological Survey, 100 W. Pender St., Vancouver, British Columbia, V6B 1R8 CANADA

Names and addresses of contributors

JA J. C. Antweiler, USGS, PO Box 25046, MS 973, Denver, CO 80225
MA M. E. Allen, Freeport-McMoRan Gold Co., PO Box 41330, Reno, NV 89504
DB D. A. Brew, USGS, MS 904, 345 Middlefield Rd., Menlo Park, CA 94025
JB J. A. Briskey, USGS, MS 901, 345 Middlefield Rd., Menlo Park, CA 94025
WB W. P. Brosge', USGS, MS 904, 345 Middlefield Rd., Menlo Park, CA 94025
DC D. P. Cox, USGS, MS 901, 345 Middlefield Rd., Menlo Park, CA 94025
JC J. B. Cathrall, USGS, PO Box 25046, MS 973, Denver, CO 80225
SC S. E. Church, USGS, PO Box 25046, MS 973, Denver, CO 80225
SL S. L. Culp, Consulting Geologist, 816 Laurel, Fort Collins, CO
HF H. L. Foster, USGS, MS 904, 345 Middlefield Rd., Menlo Park, CA 94025
JF J. G. Frisken, USGS, PO Box 25046, MS 973, Denver, CO 80225
PF P. F. Folger, USGS, PO Box 25046, MS 973, Denver, CO 80225
BG B. M. Gamble, USGS, 4200 University Dr., Anchorage, AK 99508
DG D. J. Grybeck, USGS, 4200 University Dr., Anchorage, AK 99508
JG J. E. Gray, USGS, PO Box 25046, MS 973, Denver, CO 80225
NG J. N. Grant, Billiton International Metals, PO Box 436, 2260 AK Leidschendam, The Netherlands
RG R. J. Goldfarb, USGS, PO Box 25046, MS 973, Denver, CO 80225
CH C. C. Hawley, 7011 Old Seward Highway, Anchorage, AK 99502
JH J. W. Hammitt, Kennicott, PO Box 11248, Salt Lake City, UT 84147
HK H. D. King, USGS, PO Box 25046, MS 973, Denver, CO 80225
JK J. M. Kelly, Consulting Geologist, Salt Lake City, UT
RK R. A. Koski, USGS, MS 999, 345 Middlefield Rd., Menlo Park, CA 94025
RV R. V. Kirkham, Canadian Geological Survey, 601 Booth St., Ottawa, Ontario K1A 0E8 CANADA
IL I. M. Lange, Dept. Geology, Univ. of Montana, Missoula, MT 59801
TL T. D. Light, USGS, PO Box 25046, MS 973, Denver, CO 80225
WM W. D. Menzie, USGS, MS 984, 345 Middlefield Rd., Menlo Park, CA 94025
DM D. H. Madden, USGS, PO Box 25046, MS 973, Denver, CO 80225
SN S. W. Nelson, USGS, 4200 University Dr., Anchorage, AK 99508
WN W. J. Nokleberg, USGS, MS 904, 345 Middlefield Rd., Menlo Park, CA 94025
BR B. L. Reed, USGS, 4200 University Dr., Anchorage, AK 99508
ER Earl Redman, USBM, PO Box 20550, Juneau, AK 99802
SR Scott Rose, USGS, PO Box 25046, MS 973, Denver, CO 80225
MS M. L. Silberman, USGS, PO Box 25046, MS 973, Denver, CO 80225
JS J. M. Schmidt, USGS, 4200 University Dr., Anchorage, AK 99508
TS T. E. Smith, Division of Geological and Geophysical Surveys, 794 University Ave., Fairbanks, AK 99701
RT R. B. Tripp, USGS, PO Box 25046, MS 973, Denver, CO 80225
FW F. H. Wilson, USGS, 4200 University Dr., Anchorage, AK 99508
DGGS M. W. Henning, Division of Geological and Geophysical Surveys, PO Box 772116 Eagle River, AK 99577

APPENDIX II

SAMPLE INFORMATION SHEET FOR COMMON-Pb ISOTOPIC ANALYSIS

Contributor: ______________________
address: ______________________
____
____
____
phone: ______________________
date: ______________________

Sent to: S. E. Church
Branch of Geochemistry
U. S. Geological Survey
P. O. Box 25046, MS 973
Denver, CO 80225
(303) 236-1900
FTS 776-1900

SAMPLE No. ______________________ Lab. No. ____________________
Sample Location: Lat. ______________ Long. ____________________
or sec. _____ Township _______ & Range _________
Quadrangle ________________ State _______________
Name of deposit or occurrence ___________________
USBM Region _____________ District _______________

GEOLOGIC INFORMATION
Sample Source ____________ Type of host-rock ______________________
Age of host-rock (how obtained?) ________________________________
Formation ____
Tectonostratigraphic terrane (if appropriate) ______________________
Descriptive information (structure, texture, form, etc.) ____________
____
Mineralogy of sample ____
Mineralogy of deposit ____
Gangue minerals ____
Structural and Stratigraphic relations ______________________________
____
Deposit type (Singer and Cox, 1986) _______________________________
Age of Mineralization (how obtained?) ______________________________
Size of deposit ____

Other field information:

Chemical data available: Chemical analysis ( ) Modal analysis ( )
Thin or polished sections ( ) Spectrographic analysis ( )
Stable isotopic data ( ) Other (specify) _________________

Are detailed studies of this deposit or occurrence published or in progress? ____

References: