

Table 1. Pb isotope data from sulfide mineral deposits, Russian Far East.

[Analyst: KL, Kenneth Ludwig; RV, Robert Vaughn. Mineral abbreviations used in the column marked Mineralogy are: ang, anglesite; ank, ankerite; asp, arsenopyrite; Au, gold; Ag, silver or mixed silver-bearing minerals; bg, boulangierite; bar, barite; bn, bornite; Bi, bismuth-bearing minerals; cal, calcite; cc, chalcocite; ch, chrysocolla; cin, cinnabar; cp, chalcopyrite; cr, chromite; cs, cerussite; cu, cuprite; cv, covellite; dl, dolomite; ep, epidote; fl, fluorite; gn, galena (GN where a handpicked separate is used for chemical analysis); gt, garnet; hm, hematite; lm, limonite; ma, malachite; mar, marcasite; mly, molybdenite; mt, magnetite; px, pyrrhotite; px, pyroxene; py, pyrite; qz, quartz; REE, rare-earth minerals; rut, rutile; Sb, antimony-bearing minerals; sch, scheelite; si, siderite; sl, sphalerite; Sn, tin-bearing minerals; ss, smithsonite; st, stibnite; stm, stannite; sulfosals, mixed sulfosal minerals, tt, tetrahedrite (TT where handpicked separate used for chemical analysis); and tu, tourmaline. Age abbreviations used in the columns marked Geologic Host Age and Mineralization Age are: Mz, Mesozoic; K, Cretaceous; J, Jurassic; T, Triassic; Pz, Paleozoic; P, Permian; Pn, Pennsylvanian; M, Mississippian; D, Devonian; S, Silurian; O, Ordovician; C, Cambrian; pC, Precambrian, probably Neoproterozoic(?). Empty cells indicates no data]

Subdivisions of periods are designated as early (e), middle (m), and late (l).	Sample no.	OFR 96-513A site no. (Nokleberg & others, 1996)	North latitude (DM)	East longitude (DM)	$\frac{^{206}\text{Pb}}{^{204}\text{Pb}} \pm 2\sigma$	$\frac{^{207}\text{Pb}}{^{204}\text{Pb}} \pm 2\sigma$	$\frac{^{208}\text{Pb}}{^{204}\text{Pb}} \pm 2\sigma$	Analyst	Deposit type (Cox and Singer, 1986)	Model no.	Tectonostratigraphic terrane (Nokleberg and others, 2005)	Subterranean	Host age	Mineralization age	Host rock	Structure	Texture	Mineralogy of deposit
Karalveem	KRV	R58-05	68 11	166 09	18.495 ± 0.015	15.549 ± 0.019	38.298 ± 0.062	KL	Low-sulfide Au-quartz vein	36a	Nutesyn	Chukotka	T	eK?	gabbro	igneous contact	vein	GN, asp, sch, ank, sl, py, po, Au
Ryveem	K55R-89	R60-02	69 21	178 19	18.437 ± 0.015	15.600 ± 0.019	38.278 ± 0.062	KL	Low-sulfide Au-quartz vein	36a	Chukotka	Chukotka	m Pz	K?	metasediment-hosted	shear zone	veins	asp, sl, GN, py, cp, Au
Maiskoc	M-1	R59-06	69 02	173 44	18.807 ± 0.007	15.610 ± 0.009	38.745 ± 0.030	RV	Disseminated Au		Chukotka	Eastern Asia-Arctic: Anuyi-Beringovsky	m K-IR	e K-1 K?	sediment-hosted	shear zone	disseminated	py, asp, sl, sch, gn, st, Au
Dalny	791-K	Q57-01	67 31	160 49	18.494 ± 0.015	15.528 ± 0.019	38.084 ± 0.061	KL	Epithermal Au-Ag	25d	Chukotka	Oloy	1 K	1 K?	monzonite	stockwork	disseminated	GN, cp, py, bn, sl, mly, mt, po
Innakh	332976	Q57-02	67 17	159 22	18.604 ± 0.008	15.513 ± 0.010	38.114 ± 0.033	RV	Porphyry Cu-Mo-Au	20c	Chukotka	Oloy	IR/K	1 K	volcanic rock-hosted	stockwork	veins	py, gn, sl, po, cp, mly, ank, tt, Bi, Au
Vesenee	517Bh	Q58-06	66 30	164 24	18.272 ± 0.015	15.481 ± 0.019	37.753 ± 0.061	KL	Epithermal Au-Ag	25d	Nutesyn	Oloy	1 J	1 J-K?	dacite	lens/stockwork	vein	GN, sl, py, lm, cp, bn, ma, tt, Au, Ag
Vesnovka	1066/sh84	Q55-04	64 32	149 23	17.952 ± 0.010	15.510 ± 0.013	37.763 ± 0.042	RV	Kipushi Cu-Pb-Zn	32c	Omulevka	Omulevka River	m O	O?	sediment-hosted	stratabound	vein, disseminated	gn, sl, cp, ch
Oicha	OI-1-30	Q57-07	64 57	156 26	16.209 ± 0.015	15.188 ± 0.021	37.090 ± 0.067	RV	Epithermal Au-Ag	25d	Omolon	Kedon	m D-1 D	255 Ma	volcanic rock-hosted	cross-cutting	vein	gn, sl, py, cp, sulfosals, Au, Ag
Kubaka	KBK	P57-03	63 44	160 01	17.287 ± 0.012	15.434 ± 0.016	37.462 ± 0.051	RV	Epithermal Au-Ag	25d	Omolon	Kedon	m-1 D	K?	volcanic rock-hosted	cross-cutting	vein	py, asp, gn, tt, Ag, Au
Vist	156-D-73	Q57-06	65 24	157 01	15.887 ± 0.013	15.269 ± 0.018	35.990 ± 0.058	KL	Epithermal Au-Ag	25d	Omolon	Omolon	pC	1 D?	sandstone-hosted	lens/cross-cutting	vein	GN, sl, py, cp, asp, hm, Au, Ag
Sedoi	Om-1.7.3	P57-02	63 49	158 25	17.421 ± 0.015	15.510 ± 0.019	38.394 ± 0.063	KL	Pb-Zn skarn	18c	Omolon	Eastern Asia-Arctic: Korkodon-Nayakhan	O	1 K	carbonate-hosted	igneous contact	vein, replacement	GN, ang, sl, cp, py, asp, Ag, Bi, Te, Au
Valunistoe	6246-5	Q60-05	66 28	177 38	18.022 ± 0.003	15.434 ± 0.004	38.036 ± 0.014	RV	Epithermal Au-Ag	25d	Chukotka	Eastern Asia-Arctic: Anuyi-Beringovsky	1 K	1 K?	volcanic rock-hosted	lens/podiform	vein	sl, cp, gn, argentine, Au, Ag
Medgora	M-1	Q57-06	65 17	159 32	18.317 ± 0.004	15.517 ± 0.005	38.203 ± 0.018	RV	Porphyry Cu-skarn	18a	Omolon	Left Omolon	M	e K	carbonate-hosted	igneous contact	disseminated, vein	py, asp, cp, mly, po, gt, px, mt, hm, sl
Karamken	19-1-KN74	P56-55	60 14	151 00	18.276 ± 0.007	15.525 ± 0.009	38.153 ± 0.030	RV	Epithermal Au-Ag	25d	Viliga	Eastern Asia-Arctic: Okhotsk	1 K	1 K	andesite/felsic volcanic rock-hosted	cross-cutting	quartz vein	py, sl, cp, gn, Ag, Au, Sn
Agat	Ag-1	P56-46	60 58	150 53	18.353 ± 0.007	15.532 ± 0.010	38.205 ± 0.030	RV	Epithermal Au-Ag	25d	Viliga	Eastern Asia-Arctic: Okhotsk	Ag	1 K?	andesite	cross-cutting	quartz veins	sl, cp, gn, py, asp, tt, po, Au, Ag, Hg
Tidit	24-Td-79	P56-13	62 51	155 11	18.293 ± 0.004	15.507 ± 0.006	38.189 ± 0.018	RV	Polymetallic vein-Ag-Pb-Zn	22c	Kula-Nera	Eastern Asia-Arctic: Omsukchan	e K/1 K	1 K	sediment-hosted hornfels	igneous contact	vein	gn, sl, cp, py, asp, tt, cs, Ag
Mechta	24/Mch79	P56-15	62 48	155 05	18.321 ± 0.006	15.513 ± 0.008	38.215 ± 0.025	RV	Polymetallic vein-Ag-Pb-Zn	22c	Kula-Nera	Eastern Asia-Arctic: Omsukchan	1 K	1 K?	felsic volcanic rocks	sheeted-vein	vein	gn, sl, cp, py, asp, tt, Au, Ag
Dukat	156-D-73	P56-18	62 36	155 11	18.323 ± 0.080	15.509 ± 0.071	38.195 ± 0.180	KL	Epithermal Au-Ag	25d	Kula-Nera	Eastern Asia-Arctic: Omsukchan	93 Ma	77 Ma	felsic volcanic rocks	breccia	zoned, vein	GN, sl, py, cp, asp, Ag, Sb, Au
Ircba	20-Ir-79	P56-36	61 51	155 39	18.327 ± 0.005	15.517 ± 0.007	38.179 ± 0.021	RV	Polymetallic vein-Sn	20b	Prikolyma	Eastern Asia-Arctic: Omsukchan	1 K	1 K	andesite	igneous contact	vein	gn, cs, asp, cp, py, po, Bi, Ag
Nyavenga	498-NS	P56-49	60 44	153 28	18.337 ± 0.011	15.529 ± 0.014	38.167 ± 0.047	RV	Epithermal Au-Ag	25d	Viliga	Eastern Asia-Arctic: Koni-Yablon	e K	e K	andesite/felsic volcanic rock-hosted	cross-cutting	quartz veins	py, sl, gn, cp, asp, tt, bn, mly, Ag, Au
Kandychan	14Gz90	P56-51	60 36	150 20	18.364 ± 0.015	15.537 ± 0.019	38.339 ± 0.062	KL	Polymetallic vein-Sn	20b	Viliga	Eastern Asia-Arctic: Verkhne-Kolyma	1 K	1 K	felsic volcanic rocks	cross-cutting	quartz vein	gn, cs, py, cp, asp, bn, sl, Ag
Kheta	H-1	P56-43	61 06	151 47	18.380 ± 0.004	15.539 ± 0.005	38.338 ± 0.016	RV	Polymetallic vein-Sn	20b	Viliga	Eastern Asia-Arctic: Verkhne-Kolyma	1 K	1 K	felsic volcanic rocks	breccia pipe	massive/vein	gn, sl, cp, cs, py, po, Bi, Ag
Omulev	1095/sh89	Q55-05	64 13	148 23	17.936 ± 0.014	15.532 ± 0.019	37.746 ± 0.061	KL	Austrian Alps W	15a	Omulevka	Omulevka River	m O	S?	sediment-hosted	stratabound	disseminated	GN, sch, py, cp, Sb, As minerals
Pereval	6842/ya90	P56-02	64 47	150 16	17.939 ± 0.014	15.529 ± 0.019	37.798 ± 0.061	KL	Austrian Alps W	15a	Omulevka	Urultun and Sudar Rivers	1 O	S?	carbonate-hosted	stratabound	vein	GN, qz, cal
Proivnoe	905-2/sh88	P55-06	63 30	149 18	18.063 ± 0.018	15.564 ± 0.023	37.971 ± 0.076	RV	Carbonate-hosted Pb-Zn	32a	Kula-Nera	Urultun and Sudar Rivers	e D	M-P?	carbonate-hosted	stratabound	disseminated/vein	dl, sl, gn, fl, ang
Urultun	R-419	P55-02	63 40	148 42	18.119 ± 0.015	15.559 ± 0.019	37.971 ± 0.061	KL	Carbonate-hosted Pb-Zn	32a	Kula-Nera	Urultun and Sudar Rivers	M-P	M-P?	carbonate-hosted	stratabound	disseminated	gn, dl, sl, fl, py, bar, cn, ang
Urultun	K-301/ya83	P55-02	63 40	148 42	18.107 ± 0.015	15.551 ± 0.019	37.935 ± 0.061	KL	Carbonate-hosted Pb-Zn	32a	Kula-Nera	Urultun and Sudar Rivers	M-P	M-P?	carbonate-hosted	stratabound	disseminated	gn, dl, sl, fl, py, bar, cn, ang
Deputatskoc	CD-888/b	R54-08	69 15	139 58	18.332 ± 0.015	15.525 ± 0.019	38.198 ± 0.061	KL	Polymetallic vein-Sn	15b	Omulevka	Chokurdak	J	J-K	sediment-hosted	cross-cutting	vein	gn, rut, asp, sl, stn, ss
Bulat	CD-992/a	k/p-10	69 28	139 55	18.345 ± 0.015	15.532 ± 0.019	38.238 ± 0.062	KL	Polymetallic vein-Sn	20b	Omulevka	Yana-Polousnen	J	J-K	sediment-hosted	cross-cutting	vein	gn, sl, py
Kandidatskoc	157-82	R55-03	69 24	149 44	18.440 ± 0.015	15.500 ± 0.020	38.250 ± 0.064	RV	Au-skarn	18	Omulevka	Yana-Polousnen	P	K	monzonite	igneous contact	replacement	asp, po, Au, px, gt, Co-minerals
Kunarev	6031-8/ya90	P56-04	63 24	150 55	18.513 ± 0.016	15.573 ± 0.019	38.511 ± 0.063	KL	Porphyry Cu-skarn	18a	Kula-Nera	Yasachnaya River	D/m J	1 J -e K?	carbonate-hosted	igneous contact	replacement	gn, sl, ang, cp, py, cc, Ag, Sb, Bi
Terrasnoe	K-451/ya83	P55-04	63 33	148 56	18.583 ± 0.015	15.589 ± 0.019	38.410 ± 0.062	KL	Pb-Zn skarn	18c	Kula-Nera	Yasachnaya River	1 D	1 J -e K?	carbonate-hosted	igneous contact	replacement	gn, ang, sl, cp, py, mt, lm, px, gt, qz
Cherninskoc	814-1/sh88	P56-05	63 20	151 05	18.427 ± 0.015	15.589 ± 0.019	38.445 ± 0.062	KL	Fe-skarn	18d	Kula-Nera	Yasachnaya River	1 P	159 Ma	carbonate-hosted	igneous contact	replacement	gn, sl, py, mt, cp, lm, po, hm
Taskan	926/sh88	P56-05	63 44	149 41	18.124 ± 0.005	15.558 ± 0.006	37.960 ± 0.020	RV	Carbonate-hosted F-Pb-Zn	32a	Kula-Nera	Yasachnaya River	e D	M-P?	carbonate-hosted	stratabound	disseminated	gn, sl, fl, ang, lm
Vechnoe	K-35/ya90	P56-05	63 43	149 20	18.131 ± 0.015	15.551 ± 0.019	37.979 ± 0.061	RV	Carbonate-hosted F-Pb-Zn	32a	Kula-Nera	Yasachnaya River	1 S	M-P?	carbonate-hosted	stratabound	disseminated, massive	gn, sl
Chistoe	CHK-1	R54-14	68 12	141 26	18.670 ± 0.015	15.574 ± 0.019	38.475 ± 0.062	KL	Polymetallic vein Pb-Zn	22c	Omulevka	Selennyykh River	e Pz?	Pz?	metasediment-hosted	stratabound	vein	GN, sl, ang, cr
Kondakovskoc	909/2-P83	R55-05	69 19	149 49	18.415 ± 0.007	15.524 ± 0.010	38.146 ± 0.030	RV	Carbonate-hosted Pb-Zn	32a	Omulevka	Selennyykh River	1 D	Pz?	carbonate-hosted	stratabound	vein	sl, gn, py
Kyra	TH-1	P56-05	67 35	139 20	18.593 ± 0.015	15.571 ± 0.019	38.403 ± 0.062	KL	Polymetallic vein Pb-Zn	22c	Omulevka	Omulev	O	?	carbonate-hosted	stratabound	vein	GN, sl, dl
Agyndja	588/sh84	Q55-03	65 13	148 02	18.795 ± 0.006	15.539 ± 0.008	37.956 ± 0.026	RV	Basalt or sediment-hosted Cu	23/30b	Rassokha	Rassokha	m O-1 O	O?	basalt/sandstone	stratabound	zoned	bn, cc, cp, cv, py, gn, Cu
Agyndja	610/sh84	Q55-03	65 13	148 02	19.078 ± 0.016	15.576 ± 0.020	38.044 ± 0.065	RV	Basalt or sediment-hosted Cu	23/30b	Rassokha	Rassokha	m O-1 O	O?	basalt/sandstone	stratabound	zoned	bn, cc, cp, cv, py, gn, Cu
Dogor	501/ya83	P56-01	65 11	148 15	18.018 ± 0.002	15.533 ± 0.002	37.645 ± 0.005	RV	Basalt or sediment-hosted Cu	23/30b	Rassokha	Rassokha	m	m	volcanic rock-hosted	stratiform	massive	gn, sl, py, bar
Opyt	K-3-37/21c	P56-01	63 54	152 33	18.241 ± 0.015	15.538 ± 0.019	38.494 ± 0.062	KL	Polymetallic vein Cu-Ag	22c	Prikolyma	Shamanikha	pC	?	schist-hosted	shear zone	vein, disseminated	GN, py, cp, bn, sl, cc, asp, Cu, Au
Gornoe	ABK-421	P56-02	66 36	154 19	18.126 ± 0.009	15.561 ± 0.012	38.280 ± 0.040	RV	Carbonate-hosted Pb-Zn	32a	Prikolyma	Yarkhodon	m D	?	carbonate-hosted	breccia	disseminated	gn, bar, dl, sl, py
Slezovka	ABK-517A	Q56-01	66 51	153 54	18.072 ± 0.013	15.560 ± 0.017	38.090 ± 0.056	RV	Carbonate-hosted Pb-Zn	32a	Prikolyma	Yarkhodon	m D	?	carbonate-hosted	breccia	disseminated	gn, bar, dl, sl, py
Slezovka	ABK-511	Q56-01	66 51	153 54	18.048 ± 0.015	15.540 ± 0.019	37.999 ± 0.062	KL	Carbonate-hosted Pb-Zn	32a	Prikolyma	Yarkhodon	m D	?	carbonate-hosted	breccia	disseminated	gn, bar, dl, sl, py
Khetagchan	2153-1	P57-07	63 24	157 04	17.292 ± 0.004	15.436 ± 0.006	37.954 ± 0.019	RV	Polymetallic vein-Au	22c	Viliga	Eastern Asia-Arctic: Korkodon-Nayakhan	1 K	1 K	granodiorite	igneous contact	quartz vein	gn, sl, cp, py, asp, Bi, Au, Ag, W-minerals
Tigrets-Industriya	61g78	P55-26	62 16	146 31	18.477 ± 0.015	15.546 ± 0.019	38.499 ± 0.063	KL	Polymetallic vein-Sn	20b	Kula-Nera	Eastern Asia-Arctic: Verkhne-Kolyma	1 P	1 K	sediment-hosted	podiform	vein	cs, GN, sl, py, tt, asp, Ag
Butugychag	K-203	P55-38	61 15	149 05	18.448 ± 0.015	15.541 ± 0.019	38.413 ± 0.063	KL	Polymetallic vein-Sn	15b	Kula-Nera	Yana-Kolyma	1 J-e K	K?	granite	stockwork	vein	cs, GN, qz, fl, ank, asp, py
Skarnovoe	3Gz88	P56-50	60 46	150 38	18.383 ± 0.015	15.545 ± 0.019	38.363 ± 0.062	KL	Pb-Zn-Ag skarn	18c	Viliga	Eastern Asia-Arctic: Okhotsk	1 T	?	carbonate-hosted	igneous contact	replacement	GN, sl, po, ep, Ag, Au, REE
Shkolnoe	115/Gz88	P55																