SILVER-GOLD ZONATION IN THE LASS VEIN SYSTEM, BEAVERDELL CAMP, SOUTH-CENTRAL BRITISH COLUMBIA

(82E/6E)

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INTRODUCTION

The Beaverdell silver, lead, zinc (gold) vein camp (Fig. 78), in the southern part of the Omineca Crystalline Belt in south-central British Columbia, has been a silver producer since the turn of the century. In recent years some gold has been reported in the eastern, and deeper, end of the Lass vein system (Lower Lass mine; B. Goetting, personal communication, 1979). This study was initiated to examine the distribution of major and minor elements in the Upper (Highland) Lass and Lower Lass vein system and to describe the zoning patterns, with emphasis on the economically important gold and silver.

The area is underlain by granodiorite of the Westkettle batholith, which has been intruded by the Beaverdell quartz monzonite stock (Fig. 78). The granodiorite contains remnant pendants and/or screens of metamorphosed volcanic and sedimentary rocks of the Wallace Formation (Reinecke, 1915; Christopher, 1975a, 1975b, 1976). A detailed summary of the geology is given by Watson (1981) and Watson, *et al.* (1982).

GEOLOGY

Mineralization is found in a northeast-trending 3-kilometre by 0.8-kilometre belt, referred to as the Beaverdell mine area, on the west slope of Wallace Mountain (Kidd and Perry, 1958). From west to east, the major producing mines were: Wellington, Sally, Bell, Highland Lass (Upper Lass), and Lower Lass (Fig. 78). The Upper and Lower Lass mines are presently being operated by Teck Corporation Ltd., and the samples collected for this study are from these and related workings.

Most of the veins are hosted in the Jurassic Westkettle granodiorite. Some mineralization is also found in the older Permian (?) Wallace Formation gneissic rocks, which overlie the batholith at the eastern end of the mine area, although structures tend to horsetail and disperse in these gneisses (Goetting, personal communication, 1979). Despite the apparent lack of mineralization in the younger, Tertiary, Beaverdell stock, which intrudes the batholith at the western end of the complexly faulted mine area, K/Ar and galena-lead isotope studies demonstrate that the veins are genetically related to the Beaverdell stock (Watson, 1981; Watson, *et al.*, 1982). Propylitic alteration is found in the wallrock up to 8 metres from the veins (R. Verzosa, personal communication, 1979) and thin sections of this altered granodiorite show amphiboles almost entirely converted to chlorite, and feldspars replaced by clay and calcite.

The mineralized veins occupy fissures along east-trending faults in the western part of the mine area and along northeast-trending faults in the eastern portion of the system (part of Bell, Upper Lass, and Lower Lass). Veins range from a few centimetres to a metre in width, and average 0.3 metres (White, 1949) but are rarely continuous for more than 5 to 10 metres without offset. However some ore shoots show only minor offset over horizontal distances up to 150 metres (White, 1949). The extensive faulting has been classified by White (1949). The most important type of post-ore faulting is high angle and normal. A series of widely spaced, north to northeast-striking, southeast-dipping faults divide the mineralized system into large blocks, often with up to 100 metres of vertical displacement between them. The West Terminal fault, separating the Bell and Lass mines, and the East Terminal fault, separating the Upper and Lower Lass mines, are of this type (Figs. 78 and 79). The veins are chopped into small segments by northeast-striking, closely spaced normal faults, which flatten the dip of the vein from 50 to 34 degrees (White, 1949). These faults dip to the northwest, and generally show less than a metre displacement.

Major metallic minerals in the veins are galena, sphalerite, and pyrite, with lesser amounts of arsenopyrite, tetrahedrite, pyrargyrite, chalcopyrite, polybasite, acanthite, native silver, and pyrrhotite (Reinecke, 1915; Staples and Warren, 1946a, 1946b; Watson, 1981; Watson, *et al.*, 1982). The gangue material is mainly quartz, with some altered wallrock fragments included in the vein; small concentrations of calcite and fluorite are also found occasionally. Some supergene silver mineralization is present, chiefly as native silver wires and plates. However, most of the mineralization is of hypogene origin (McKinstry, 1928; Staples and Warren, 1946a, 1946b). Supergene material is not considered in this study.

DATA COLLECTION AND ANALYSIS

Bulk chip and hand samples of vein material within the granodiorite were collected from 209 locations in the Lass system (Fig. 79). A systematic sample spacing was not possible due to vein geometry, so vein material was chip sampled wherever accessible in the workings. Samples from mined-out areas were taken from the edges of ore shoots.

Samples were analysed by atomic absorption spectrophotometry at the Department of Geological Sciences, The University of British Columbia for zinc, lead, iron, copper, cadmium, silver, calcium, magnesium, manganese, cobalt, and nickel. Gold, arsenic, mercury, and antimony were analysed for by Min-En Laboratories Ltd., North Vancouver, British Columbia. Results are in Table 1. Duplicate analyses of samples were evaluated using the method of Thompson and Howarth (1978). The following indicate the precisions for each element (at average concentrations) determined by this method: (1) between 5 and 10 per cent: copper, cadmium, antimony, arsenic, and manganese; (2) between 10 and 20 per cent: zinc, lead, calcium, and magnesium; (3) between 20 and 30 per cent: silver; and (4) between 40 and 45 per cent, gold. Precision for elements estimated as the mean relative error rather than as a function of concentration as in the Thompson and Howarth method are: nickel, 10 per cent; iron, 35 per cent; cobalt, 38 per cent; and mercury, 120 per cent.

The true spatial relationship between samples at the time of emplacement cannot be seen using the mine plan view because of post-ore faulting. Therefore, the veins were palinspastically reconstructed by removing the movement along major faults. Since most mining was carried out on the fault-bounded segments of the vein, the ore encountered along a drift could represent either a series of parallel veins or progressively lower sections of the same vein. Within the fault-bounded, major sections, therefore, it is assumed that successive samples represent a general continuation of the major vein system, down dip. This reconstructed plane may be up to 100 metres thick in some areas, because not all movement has been removed and the mineralization probably occurs within a series of subparallel veins. In this study, however, this plane is considered to represent a single vein, or a series of veins for which an overall zoning pattern can be examined. Figure 79 shows the sample locations on the composite plan of the workings. The reconstructed plans, used for all subsequent interpretations, are shown on Figures 80 to 84. Changes in element content down the dip of the vein can be examined by projecting all points onto an east-west line (approximately down dip), and plotting value versus distance along this line. These plots, called section plots, are shown with reconstructed plans on Figures 80, 81, and 84.

INTERPRETATION AND DISCUSSION

Histograms show that all elements have lognormal distributions. Nickel and cobalt are often not present in detectable quantities and will not be considered further. Poor reproducibility for mercury analyses makes their use suspect, but mercury will be discussed because of its importance in many ore-forming environments.

Each element can be partitioned into populations using lognormal probability plots as outlined in Sinclair (1976). Three populations can be defined for silver and lead, and one for mercury and calcium. All other elements can be partitioned into two populations. The means, standard deviations, and population proportions are listed in Table 2. In this table elements are grouped on the relative proportions of anomalous population (A) and background populations (B and B'). The lower two silver populations show a split similar to zinc and cadmium, while the most anomalous population is proportionately similar to copper and arsenic. This suggests that the most anomalous silver values may be associated with copper and arsenic minerals such as sulphosalts, while the moderately anomalous concentrations of silver are associated with base metal minerals such as galena and sphalerite. Gold does not have population proportions similar to any other elements (Table 2). It is possible that only one gold population is present and that the 10 per cent background population represents a bottom truncation of the data due to the detection limits of the analytical equipment used (Sinclair, 1976), rather than a second population.

Correlations are generally only applicable to single population variables. The large amount of overlap (estimated 30 to 70 per cent) among populations for most of the elements, however, allows the use of correlations to show approximate relationships. A correlation matrix of log transformed data (Table 3) shows strong correlations at the 0.1 significance level between the elements zinc, lead, iron, copper, cadmium, silver, gold, and antimony. The gangue elements, manganese, magnesium, and calcium, show strong correlations with each other. Calcium shows negative correlations with silver and arsenic, while magnesium correlates negatively with copper, antimony, arsenic, and gold. Ranked on strength of correlation, silver correlates with lead, zinc, copper, iron, antimony, gold, cadmium, and arsenic. For gold, the strongly correlated elements are, in order: iron, lead, zinc, copper, cadmium, antimony, arsenic, and silver. This suggests that silver is associated with galena and sphalerite and, to a lesser extent, with antimony sulphosalts. Gold correlates most strongly with iron minerals, followed by the major sulphides, galena and sphalerite. Thus, gold is primarily associated with pyrite and/or chalcopyrite; arsenic and antimony minerals, while significant, appear to be less important. Correlations for the three indicator elements, mercury, arsenic, and antimony are: (1) mercury correlates with antimony, copper, zinc, lead, and cadmium; (2) arsenic correlates with antimony, gold, iron, silver, and lead; and (3) antimony correlates with iron, lead, copper, zinc, gold, mercury, arsenic, cadmium, and silver. From this, it appears that antimony is the most dominant of these three indicator elements. Because much of the correlation matrix simply shows the affinity of all the sulphides for each other, some correlations would be expected even if the minerals they represent were not contemporaneous. Antimony, however, seems to correlate with all ore-forming elements and was a more significant element than arsenic in the vein-forming solutions. Detailed studies of the mineralogy (Staples and Warren, 1946a, 1946b; McKinstry, 1928) show that pyrargyrite and tetrahedrite (antimony end members) are the common forms of their respective solid solution series in this vein system. Arsenopyrite probably formed earlier than other ore minerals such as galena and sphalerite (Watson, 1981).

Spatial relationships among populations can be seen when the assay values (Table 1) are computer-drawn, using different symbols for background and anomalous values, on the reconstructed plan and section plots of Figures 80 to 84. Anomalous values for silver occur mainly in the central, western portion of the mine. By comparison, the 10 per cent of the values which form the background population for gold lie mainly in the western part of the mine (Figs. 81 and 83).

Differences in values between the upper, western and lower, eastern parts of the mine are clear on Figures 82 and 83. The highest values (approximately one-quarter of the sample points) for zinc, lead, and gold are in the eastern part of the vein system. Plan and section plots on Figure 84 show that ratios of gold to silver are dramatically different in the two parts of the vein system; 17 of the highest 20 values for gold/silver are in the eastern section, and the highest 50 values for silver/gold are in the western part of the mine.

The two segments, defined previously, were split into two equal sections (based on distance down dip) to see if smaller subdivisions in the zoning pattern were present. Means, with standard errors, for the four subdivisions are plotted on Figure 85 along with the same statistics using only two subdivisions of the vein. Three of the four elements (lead, silver, and gold) show level sections and sharp changes indicating that values within each of the two major sections are similar, but that major changes occur between the two sections. Thus, Figure 85 is consistent with only two major zones in the mine.

A north-trending line between high silver, moderate lead and zinc in the west, and low silver, high gold, and moderate to high lead and zinc in the east is drawn on Figures 80 to 85. This line is placed near the central part of the mine, about 120 metres east of the East Terminal fault. Figure 86 summarizes the changes across the line as noted above or as detailed in fluid inclusion, mineralogy, and geometry studies by Watson (1981).

Because of the difference in the number of samples on either side of this dividing line ($N = 159$ to the west and $N = 42$ to the east), t-tests and F-tests were performed to determine if, indeed, the two populations are significantly different ($\alpha = 0.05$). The following elements (logrithmic) have significantly different geometric means (t-test) and variances (F-test) in the two parts of the mine: gold, zinc, lead, cadmium, and mercury. Vein thickness (arithmetic) also has significantly different means and variances on either side of the dividing line. Gold, zinc, lead, cadmium, and vein thickness means are higher in the eastern part of the mine while silver and mercury means are higher in the west.

CONCLUSIONS

The presence of silver-gold zonation in the Lass vein system has been known to exist for several years (B. Goetting, personal communication, 1979; Christopher, 1975a, 1975b). This study has examined the major and minor element distribution patterns in samples from the Lass vein system hosted in the Westkettle granodiorite. The vein system was palinspastically reconstructed into a single plane by removing the movement along major post-ore faults to examine the original element zoning. Fifteen elements have been studied (zinc, lead, copper, iron, manganese, cadmium, calcium, magnesium, cobalt, nickel, gold, silver, mercury, arsenic, and antimony), all of which can be partitioned into 1, 2, or 3 lognormally distributed populations. The correlation matrix of elements indicates that silver associates with galena, sphalerite, and antimony sulphosalts, but that gold associates with pyrite and chalcopyrite.

The four major economic elements, zinc, lead, silver, and gold, have been considered in detail. Plan views show a series of ore shoots, elongate along strike, *en echelon* down the dip, in the upper part of the vein system. Metal zoning and mineral deposition are related to depth and reflect changes in temperature or vein configuration at specific elevations.

Two zones of distinctive mineralization are recognized in the Lass vein system. The boundary between these two zones trends north-south and lies within the Lower Lass mine, about 120 metres east of the East Terminal fault. In contrast to the lower, eastern part, the upper, western portion of the vein system is characterized by high silver and moderate zinc and lead values, more gangue, and thinner veins within multiple vein and stringer zones. The lower, east end of the vein system, however, contains high gold, moderate to high zinc and lead, and low silver values. The elements copper, calcium, magnesium, and arsenic show consistent values throughout the mine.

Gold values are concentrated at depth and in several small zones along the footwall of the system. Silver values are highest in the upper parts of the system, centrally between the footwalls and hangingwalls. Using information from a fluid inclusion study (Watson, 1981), the gold mineralization can be related to solutions of higher temperature, salinity, and pressure. This model postulates that groundwater mixing occurred above a throttling point, resulting in lower temperature, lower salinity, and lower pressure solutions that deposited the silver mineralization. A model for element zonation in this system, based in part on the fluid inclusion studies, is shown on Figure 86. This model accounts for: (1) the presence of only two zones (above and below the throttle point), and (2) the variations in thickness, gangue, and mineralogy due to temperature, pressure, and salinity changes. Deposition of copper, calcium, magnesium, and arsenic was apparently not affected by the changes occurring in the ore fluids. Gold solubilities, however, are greatly affected by these variations (Helgeson and Garrels, 1968), so the deposition of gold would decrease after the solutions have passed the throttle point.

This model suggests that high gold values could continue eastward at depth, given continuation of vein structures. Silver values would probably also continue to the east at their moderate to low values.

Additional areas of high silver values are unlikely east of the present workings and at depth in the system and will only be found in those areas that were above the throttle point (in the western part of the mine).

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REFERENCES

Christopher, P. A. (1975a): Highland Bell (Beaverdell) Mine (82E/6E), *B.C. Ministry of Energy, Mines & Pet. Res.*, Geology, 1975, pp. G30-G33.

.... (1975b): Carmi-Beaverdell Area (82E/6, 11), *B.C. Ministry of Energy, Mines & Pet. Res.*, Geological Fieldwork, 1974, Paper 1975-1, pp. 27-31.

.... (1976): Beaverdell Area (82E/6E), *B.C. Ministry of Energy, Mines & Pet. Res.*, Geological Fieldwork, 1975, Paper 1976-1, p. 15.

Helgeson, H. C. and Garrels, R. M. (1968): Hydrothermal Transport and Deposition of Gold, *Econ. Geol.*, Vol. 63, pp. 622-635.

Kidd, D. F. and Perry, O. S. (1958): Beaverdell Camp, B.C., in *Structural Geology of Canadian Ore Deposits, Vol. II, 6th Commonwealth and Metallurgical Congress, Canada, 1957, C.I.M.*, pp. 136-141.

McKinstry, H. E. (1928): Silver Mineralization at Beaverdell, British Columbia, *Econ. Geol.*, Vol. 23, pp. 434-441.

Reinecke, L. (1915): Ore Deposits of the Beaverdell Map Area, *Geol. Surv., Canada,* Mem. 79, 178 pp.

Sinclair, A. J. (1976): Applications of Probability Graphs in Mineral Exploration, *Assoc. Explor. Geochem.*, Special Vol. 4.

Staples, A. B. and Warren, H. V. (1946a): Minerals from the Highland-Bell Silver Mine, Beaverdell, British Columbia, *University of Toronto,* Geol. Ser. 50, pp. 27-33.

Staples, A. B. and Warren, H. V. (1946b): Mineralogy of the Ores of the Highland-Bell Mine, *Western Miner,* Vol. 19, May, 1946, pp. 38-43 and June, 1946, pp. 54-58.

Thompson, M. and Howarth, R. J. (1978): A New Approach to the Estimation of Analytical Precision, *Jour. Geochem. Expl.*, Vol. 9, pp. 23-30.

Watson, P. H. (1981): Genesis and Zoning of Silver-Gold Veins in the Beaverdell Area, South-Central British Columbia, M.Sc. thesis, *University of British Columbia,* 156 pp.

Watson, P. H., Godwin, C. I., and Christopher, P. A. (1982): General Geology and Genesis of Silver and Gold Veins in the Beaverdell Area, South-Central British Columbia, *Cdn. Jour. Earth Sci.,* Vol. 19, No. 6, pp. 1264-1274.

White, W. H. (1949): Beaverdell, *B.C. Ministry of Energy, Mines & Pet. Res.,* Ann. Rept., 1949, pp. 138-148.

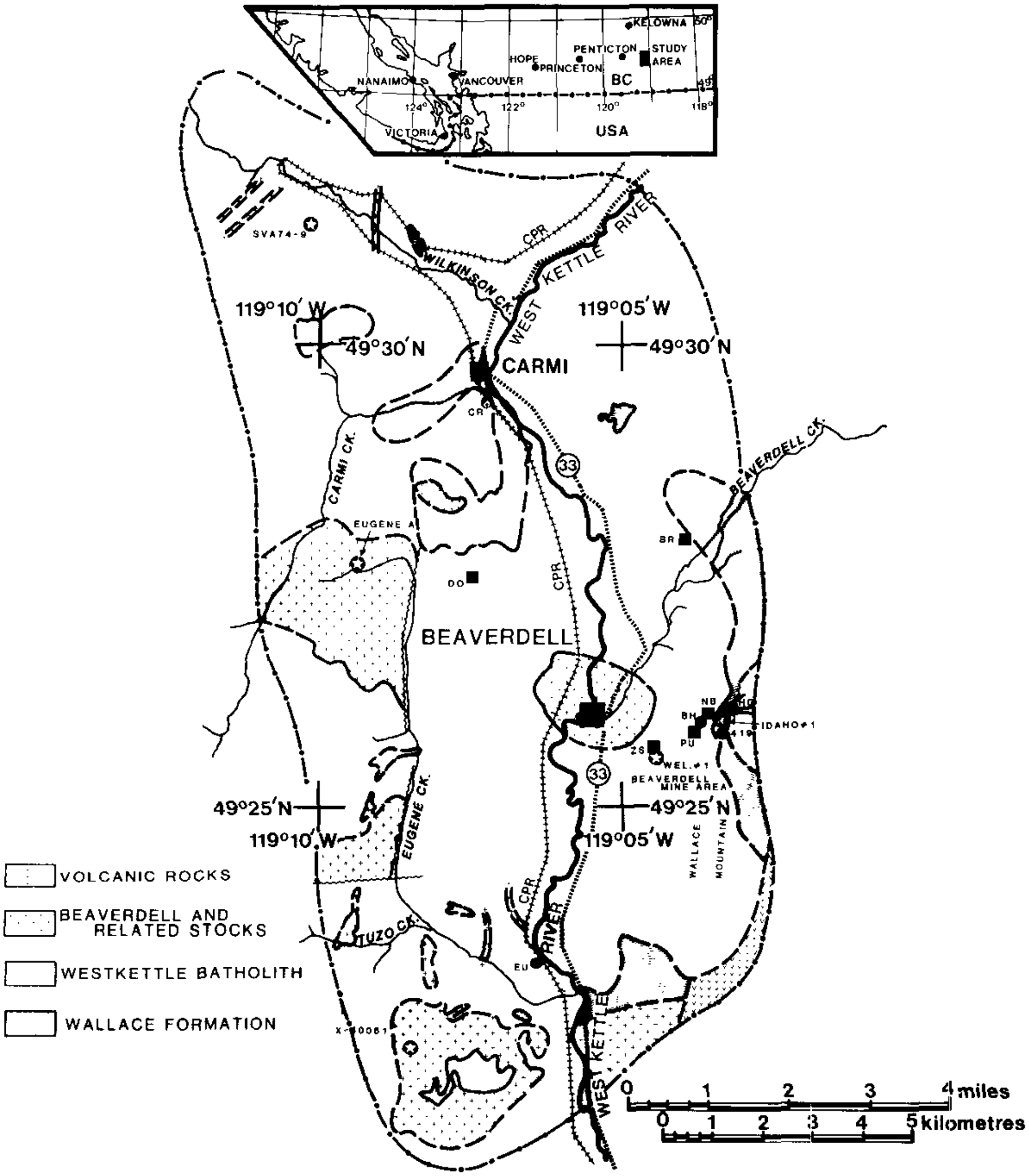

Figure 78. Regional geology with locations of major mines in the Beaverdell mine area, south-central British Columbia. Modified from Reinecke, 1915 and Christopher, 1975a, 1975b, and 1976.

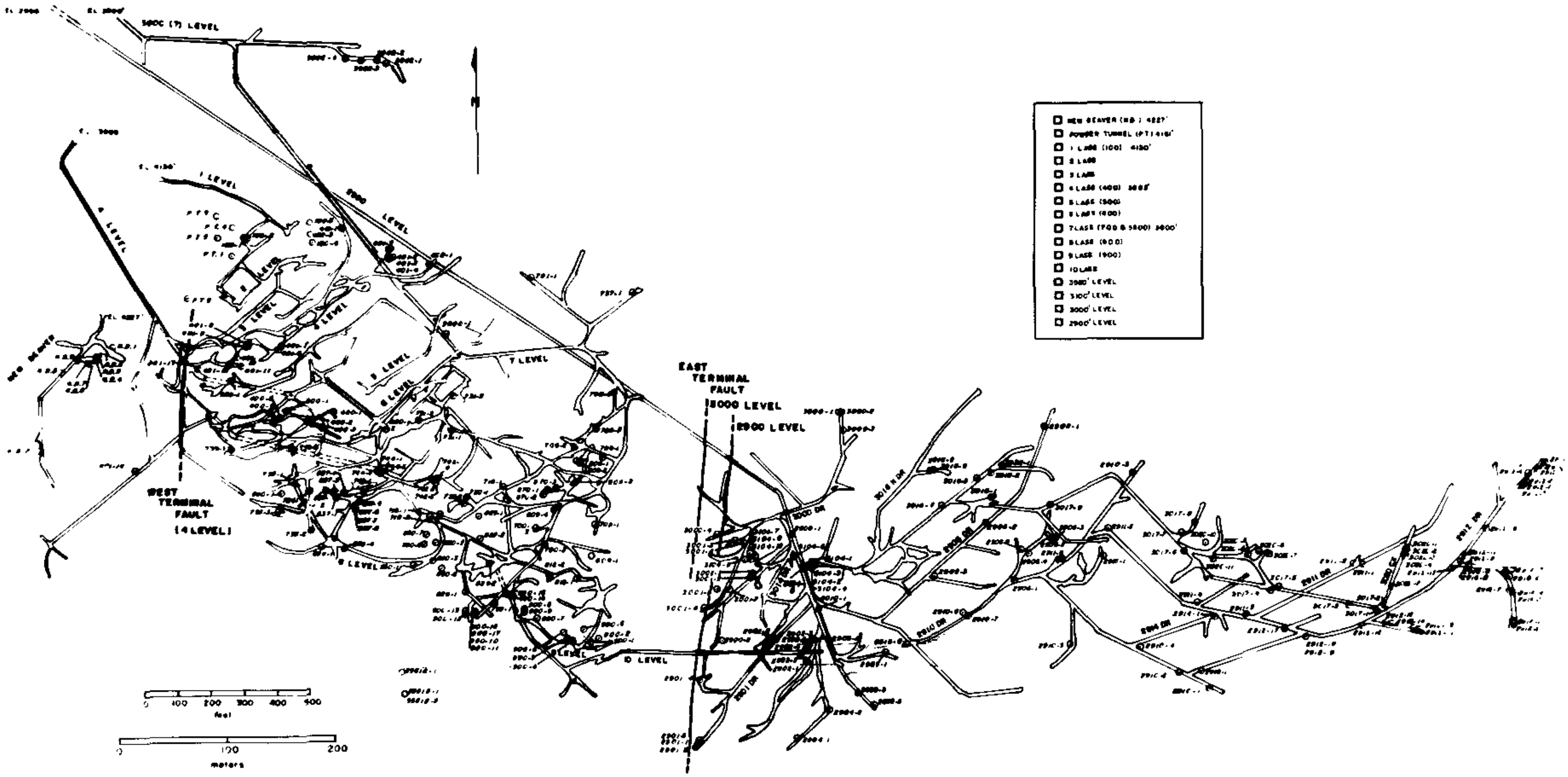

Figure 79. Sample locations (data in Table 1) on the composite plan view of the Upper and Lower Lass vein system, Beaverdell area. Mine drifts, stopes, and the West and East Terminal faults are located.

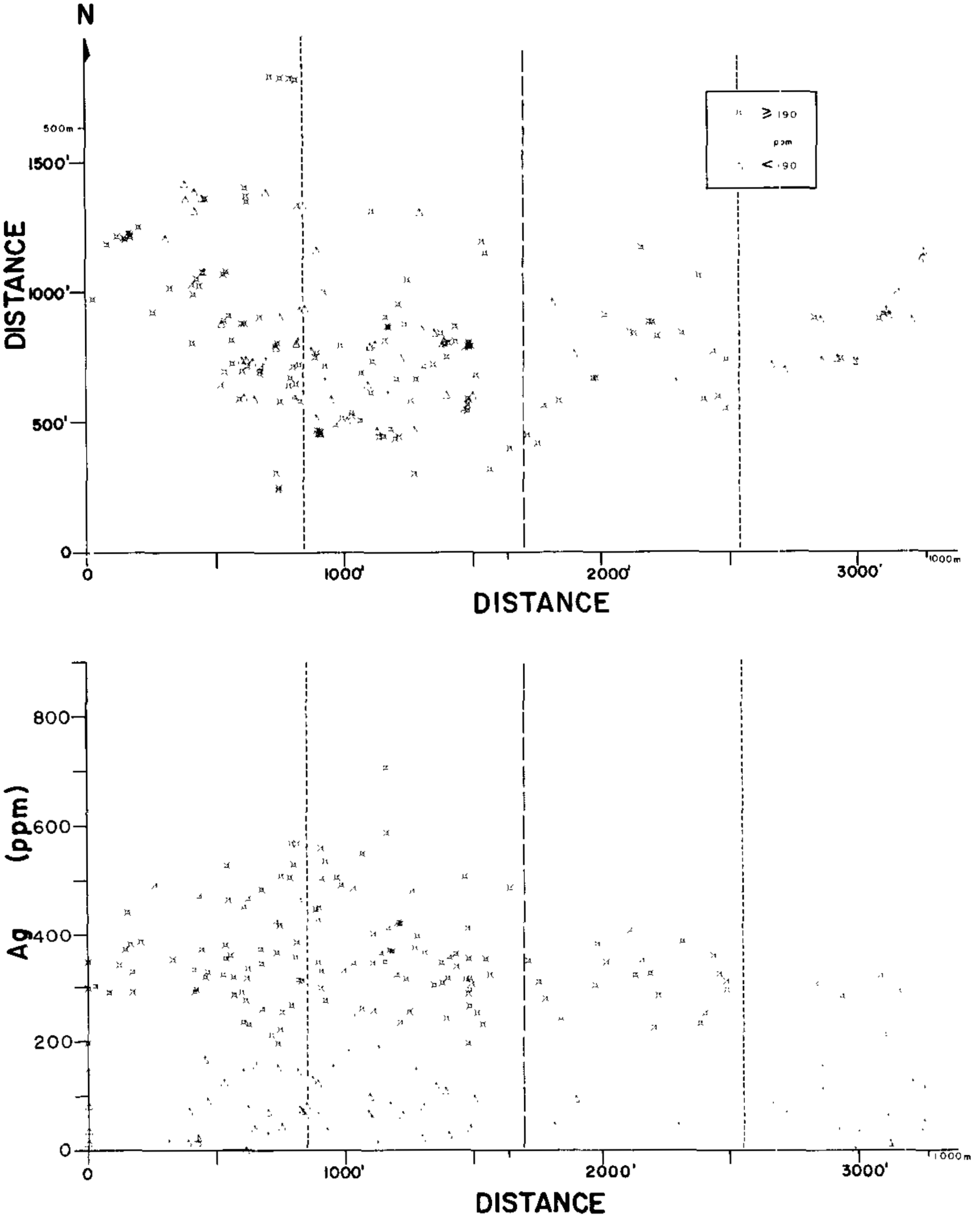

Figure 80. Reconstructed plan and 'section' plot of the Lass vein system, Beaverdell mine area. Silver analyses are separated into background and anomalous populations as noted in the legend. Long dashed line marks the boundary between the silver and gold-rich sections of the mine, and short dashed lines indicate the divisions for calculations of four-way means (see Fig. 85).

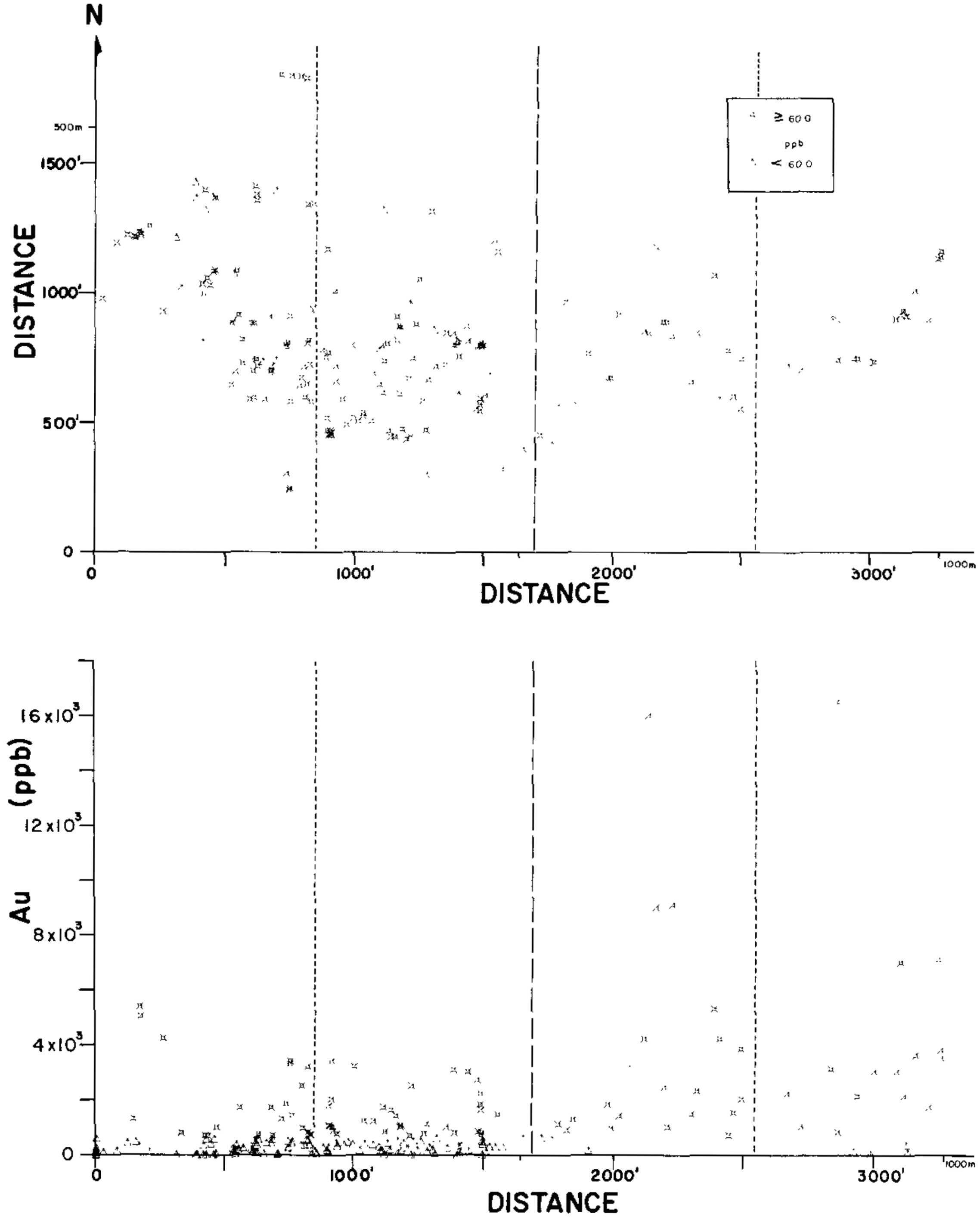

Figure 81. Reconstructed plan and 'section' plot of the Lass vein system, Beaverdell mine area. Gold analyses are separated into background and anomalous populations as noted in the legend. Long dashed line marks the boundary between the silver and gold-rich sections of the mine, and short dashed lines indicate the divisions for calculations of four-way means (see Fig. 85).

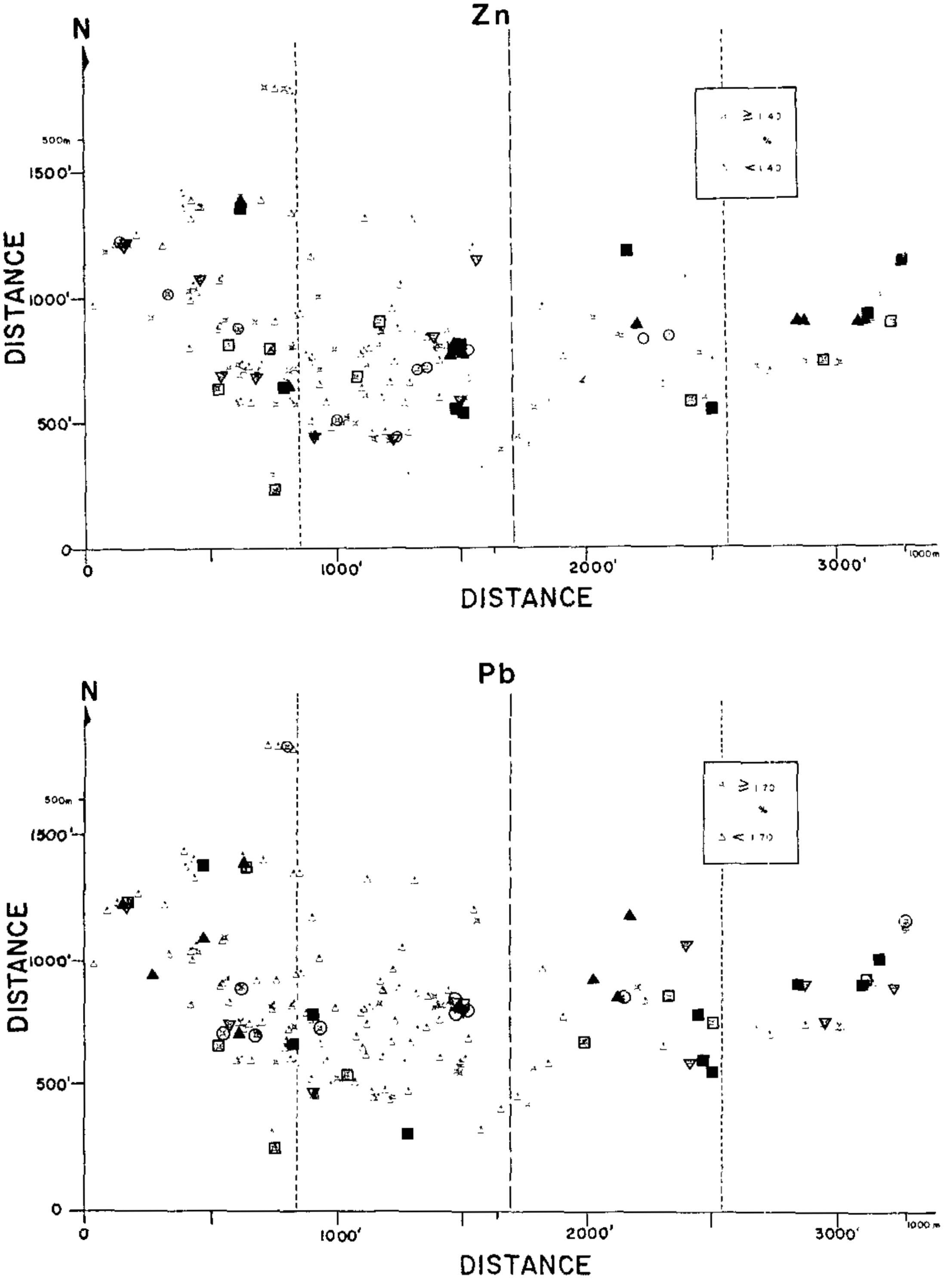

Figure 82. Reconstructed plans of the Lass vein system, Beaverdell mine area. The highest 50 analyses for zinc (top) and lead (bottom) are plotted using the following: solid square, first 10; solid triangle, second 10; open square, third 10; open triangle, fourth 10; and open circle, fifth 10.

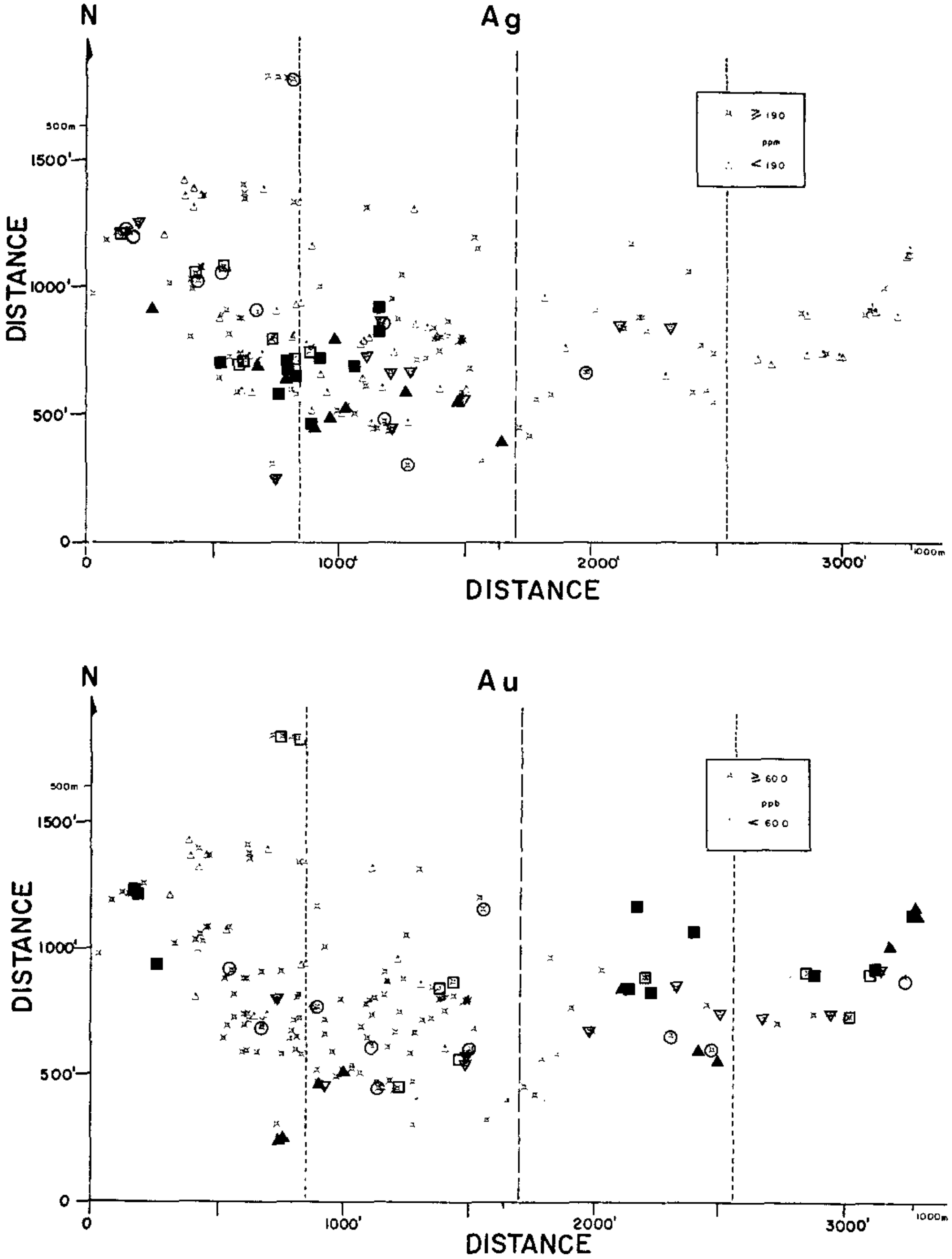

Figure 83. Reconstructed plans of the Lass vein system, Beaverdell mine area. The highest 50 analyses for silver (top) and gold (bottom) are plotted using the following: solid square, first 10; solid triangle, second 10; open square, third 10; open triangle, fourth 10; and open circle, fifth 10.

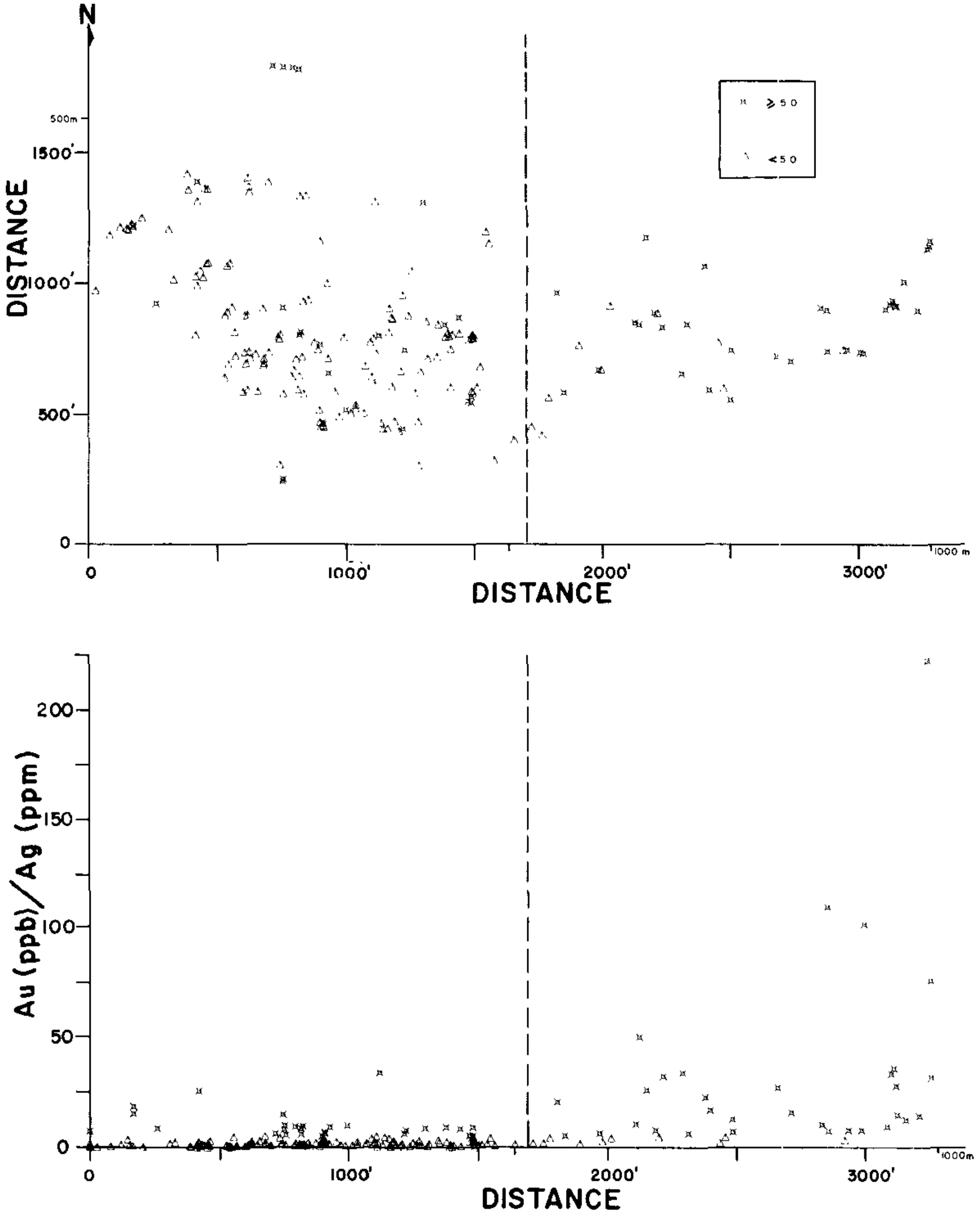

Figure 84. Reconstructed plan and 'section' plot of the Lass vein system, Beaverdell mine area. Gold (ppb)/Silver (ppm) values are separated into two populations, above and below a ratio of 5. Long dashed line marks the boundary between silver and gold-rich sections of the mine.

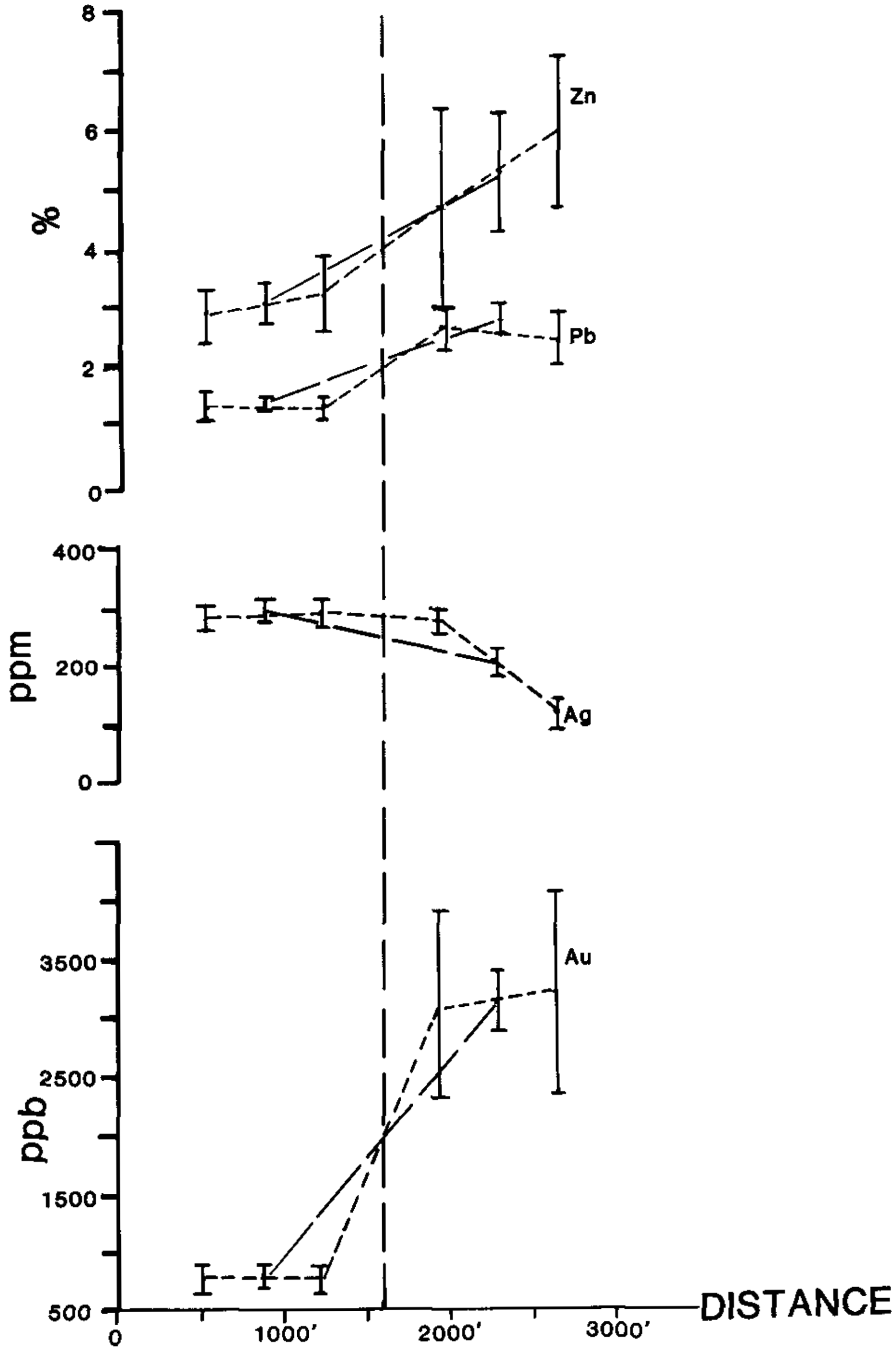

Figure 85. Plot of arithmetic means and standard errors of the mean for gold, silver, lead, and zinc, after division of the Lass vein system, Beaverdell area, into two and four sections (see Figs. 81 to 84). Left-hand side of the plot is uppermost, western section of the vein system; the right-hand side is down dip, deepest, and easternmost section of the mine. Distance is measured along the reconstructed plane of the vein.

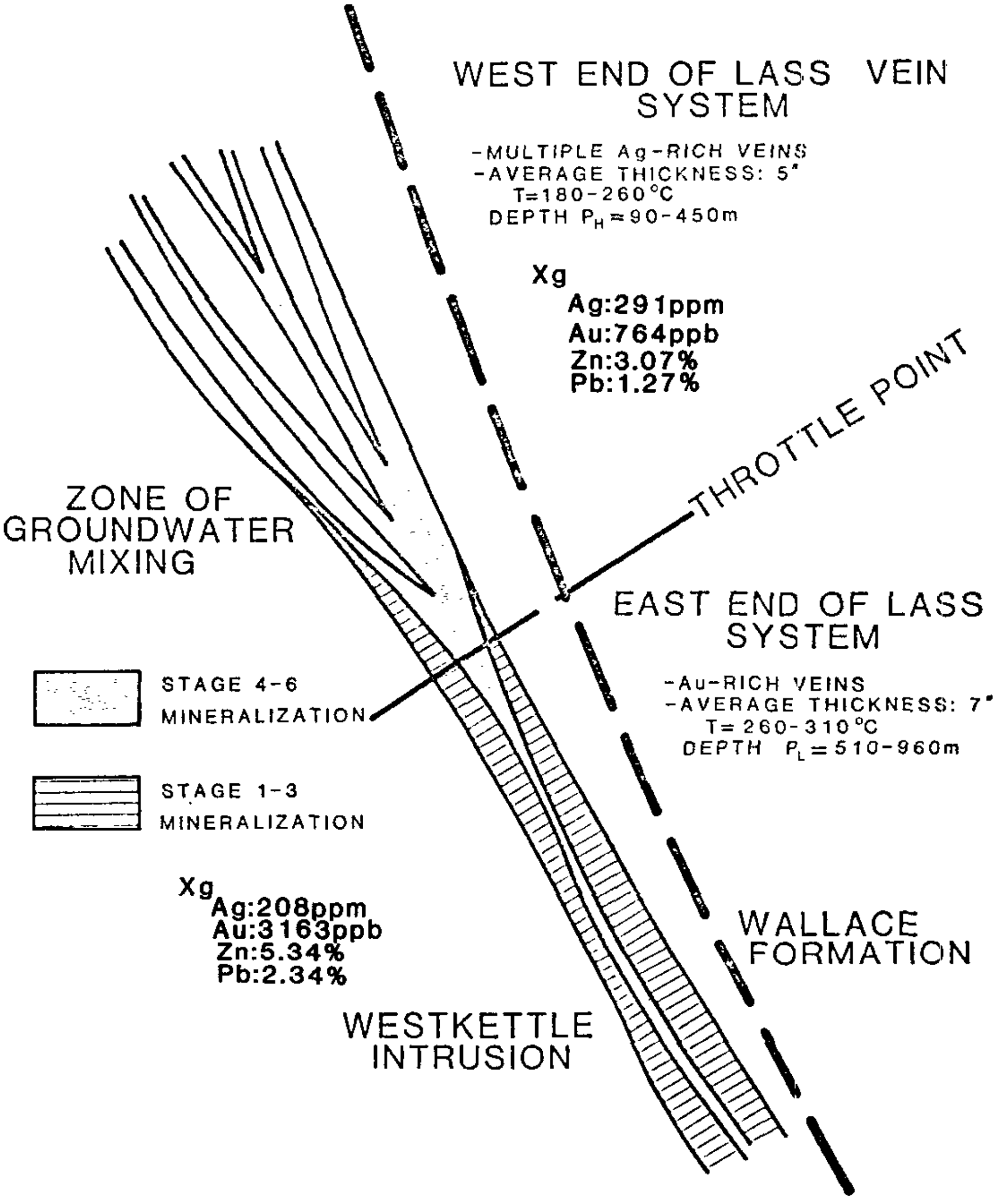

Figure 86. Model of the Lass vein system, Beaverdell area. The vein is divided into an upper, silver-rich part and a lower, gold-rich part. Average values for key elements and vein thicknesses are noted on the model. Mineralization stages and temperature and depth (P_H = hydrostatic pressure, P_L = lithostatic pressure) estimates are from fluid inclusion studies (Watson, 1981).

TABLE 1. Atomic Absorption Spectrophotometry Analyses from 209 Chip Samples (Located on Fig. 79) of Granodiorite-Hosted Vein Material from the Lass Vein System, Beaverdell Camp, B.C.

SAMPLE	ZN%	PB%	CU PPM	FE%	MN PPM	CD PPM	CA PPM	MG%	CO PPM	NI PPM	AU PPB	AG PPM	HG PPB	AS%	SB PPM
BSTH-1	0 099	0.021	35.	4 028	8986.	14.	193.	0.224	1.	0	260.	36.	50.	1.350	75.
SFCE-7	1.650	0.205	343.	2.222	1057.	173.	1640.	0.226	4.	0.	610.	346.	100.	0.112	35.
BSTH-2	0.068	0.025	36.	4.328	6902.	0.	9697.	0.519	54.	0.	5.	15.	25.	0.032	45.
HC-2	0.744	0.168	97.	2.630	4323.	79.	5360.	0.281	4.	0.	70.	146.	10.	1.020	60.
JSON-1	0.347	0.122	67.	2.248	2514.	41.	18663.	0.613	8.	0.	15.	83.	25.	0.058	25.
HC-1	2.996	1.001	726.	4.188	10690.	339.	6694.	0.260	0.	0.	100.	298.	50.	1.320	380.
BSTH-3	8.346	0.460	306.	3.111	6313.	1070.	298.	0.175	5.	0.	155.	198.	405.	1.190	80.
SFCE-6	0.044	0.045	46.	1.030	1398.	0.	36730.	0.098	0.	0.	25.	37.	10.	0.100	30.
NB-2	0.275	0.330	100.	3.046	10076.	35.	4430.	0.461	0.	0.	110.	302.	480.	1.090	110.
NB-3	1.750	0.483	218.	2.134	2044.	198.	6005.	0.254	4.	0.	160.	290.	50.	0.550	50.
NB-9	0.380	1.137	325.	3.715	1213.	48.	3535.	0.241	3.	0.	440.	342.	25.	0.920	230.
NB-7	2 157	3.674	955.	14.492	609.	270.	802.	0.105	0.	0.	1300.	372.	110.	0.260	1000.
NB-8	4.485	4.056	2577.	12.883	563.	593.	2436.	0.109	0	0.	475.	443.	62.	0.500	5650.
NB-6	1.589	0.539	244.	2.608	1664.	18.	3074.	0.331	6.	0.	325.	383.	18.	0.234	25.
NB-4	6.564	2.457	1175.	10.844	973.	817.	2250.	0.105	0.	0.	5050.	329.	170.	0.170	150.
NB-5	6.359	3.090	1423.	8.064	954.	790.	2853.	0.150	3.	0.	5400.	290.	90.	0.152	130.
NB-1	0.930	0.560	166.	2.542	1492.	111.	22009.	0.226	0.	0.	125.	388.	50.	0.096	65.
401-14	1.625	4.110	1158.	9.680	5324.	194.	22430.	0.557	5.	0.	4250.	493.	200.	1.090	170.
PT-2	0.167	0.041	42.	3.289	2031.	10.	3693.	0.308	8.	11.	25.	14.	18.	0.200	50.
401-13	5.323	1.056	940.	5.035	2051.	690.	863.	0.175	5.	0.	800.	351.	6.	1.210	110.
PT-3	0.887	0.032	1686.	0.956	255.	293.	7598.	0.082	12.	0.	10.	15.	50.	0.015	30.
PT-5	0.048	0.136	70.	0.845	754.	0.	10607.	0.149	9.	0.	15.	72.	270.	0.027	20.
401-12	2.087	0.404	226.	3.834	2855.	266.	900.	0.221	6.	0.	350.	291.	6.	0.700	70.
739-1	0.080	0.163	295.	2.840	1634.	0.	7838.	0.687	25.	8.	10.	332.	18.	0.072	50.
500-1	0.422	0.172	104.	3.728	1317.	47.	139.	0.150	2.	0.	710.	296.	18.	1.310	60.
PT-1	0.083	0.103	56.	1.763	869.	0.	16021.	0.527	3.	0.	10.	16.	30.	0.064	40.
PT-4	0.020	0.102	27.	5.051	17699.	0.	27273.	0.651	0.	0.	580.	23.	120.	1.390	120.
401-10	0.402	0.257	82.	3.282	1140.	50.	67.	0.132	0.	4.	690.	473.	2.	1.360	160.
401-11	0.496	2.036	756.	4.153	1392.	44.	417.	0.223	4.	0.	400.	372.	2.	0.680	100.
100-1	0.635	0.324	96.	2.505	7853.	82.	10051.	0.505	4.	0.	25.	168.	780.	0.910	80.
401-8	6.641	4.290	688.	5.040	3311.	860.	252.	0.176	5.	0.	580.	319.	18.	1.090	155.
401-9	1.157	0.216	313.	2.831	4569.	153.	1927.	0.324	6.	0.	65.	91.	2.	0.106	40.
100-2	0.868	5.557	623.	6.884	3043.	146.	1019.	0.258	4.	0.	1000.	328.	910.	1.140	150.
735-3	7.319	3.303	626.	8.432	5069.	926.	3402.	0.355	5.	0.	235.	324.	140.	0.950	185.
400-4	0.953	0.122	133.	3.051	7901.	115.	3355.	0.257	0.	0.	120.	126.	30.	1.110	30.
400-5	1.159	0.381	157.	3.654	3596.	143.	266.	0.228	6.	0.	185.	354.	18.	0.910	45.
401-6	0.030	0.036	4301.	2.265	400.	13.	47.	0.048	7.	0.	35.	381.	2.	0.084	55.
890-1	5.346	2.908	613.	10.312	1801.	685.	238.	0.192	4.	0.	360.	529.	180.	0.220	120.
401-7	1.195	2.151	213.	5.310	7041.	148.	645.	0.245	7.	0.	180.	466.	10.	1.300	160.
600-1	3.527	2.443	3372.	8.521	5986.	487.	1343.	0.210	3.	0.	1700.	360.	90.	1.410	1550.
739-2	7.375	0.667	1242.	5.260	1024.	1030.	280.	0.066	4.	0.	250.	319.	405.	0.960	360.
735-1	1.982	3.890	1080.	8.130	1505.	1224.	4841.	0.177	5.	0.	230.	286.	240.	0.550	205.
839-1	0.650	0.284	110.	3.743	1124.	77.	1766.	0.429	5.	0.	190.	290.	2.	0.140	45.
400-2	2.955	1.159	511.	3.449	13091.	347.	1404.	0.303	4.	0.	140.	236.	240.	0.970	70.
837-2	3.235	0.171	372.	3.205	4037.	419.	10284.	0.429	7.	0.	85.	144.	62.	0.260	30.
735-4	3.621	4.604	301.	4.261	3080.	470.	10243.	0.271	4.	0.	520.	454.	62.	0.144	90.
400-3	4.437	2.549	437.	8.784	32605.	666.	1140.	0.546	3.	0.	440.	275.	80.	1.300	190.
735-2	0.161	0.104	64.	1.886	2570.	31.	3833.	0.192	4.	0.	75.	0.	25.	0.840	35.
100-5	1.531	0.312	127.	6.726	2958.	167.	1182.	0.275	6.	0.	360.	316.	40.	1.390	175.
837-3	0.050	0.058	40.	1.457	984.	0.	20797.	0.075	0.	0.	75.	77.	60.	0.840	40.
100-3	9.834	4.230	1720.	9.490	7140.	1454.	6125.	0.254	3.	0.	585.	334.	120.	1.340	1100.

100-4	19.244	3.289	1885.	12.971	3021.	2411.	243.	0.227	0.	0.	565.	233.	670.	1.170	1450.
837-1	3.839	0.751	438.	4.757	1693.	464.	1191.	0.140	3.	0.	740.	467.	100.	0.880	65.
837-4	0.162	0.101	63.	2.522	1558.	17.	807.	0.228	5.	0.	40.	41.	40.	0.256	35.
850-4	0.288	0.186	41.	4.190	1712.	32.	1814.	0.195	4.	0.	430.	158.	10.	1.660	65.
400-1	2.244	0.345	180.	4.266	3918.	253.	21942.	0.252	0.	0.	420.	372.	10.	1.190	80.
837-7	6.387	2.798	571.	14.934	727.	806.	479.	0.124	0.	0.	1700.	345.	200.	0.510	205.
837-6	3.365	1.390	412.	8.610	1495.	352.	79.	0.223	4.	0.	690.	485.	50.	1.200	125.
837-5	3.913	1.586	494.	4.939	7460.	479.	8719.	0.776	7.	0.	550.	261.	90.	0.880	40.
742-1	0.290	0.052	45.	4.665	7737.	41.	90542.	0.740	2.	0.	20.	28.	18.	0.056	85.
401-1	0.715	0.240	133.	1.343	738.	103.	3345.	0.148	2.	0.	50.	70.	6.	0.046	10.
3802-4	2.342	0.652	366.	8.674	1073.	273.	1600.	0.181	5.	0.	1300.	212.	12.	0.790	75.
744-3	9.256	1.958	1525.	10.744	676.	1238.	672.	0.055	0.	0.	1850.	425.	110.	1.380	2450.
744-2	0.722	0.471	325.	4.106	6511.	105.	28169.	0.427	6.	0.	240.	153.	25.	1.290	110.
3561A-1	1.710	1.040	237.	5.140	4643.	197.	7506.	0.625	6.	0.	500.	366.	2.	0.890	85.
744-1	0.472	0.363	102.	2.948	2040.	57.	1269.	0.264	4.	0.	280.	197.	18.	1.200	75.
3561B-2	3.859	3.327	719.	9.748	4267.	470.	30754.	0.343	6.	0.	3300.	224.	950.	0.144	90.
3561B-1	7.312	1.399	923.	7.840	9138.	874.	29014.	0.714	7.	0.	3400.	420.	6.	0.178	80.
600-2	0.830	0.160	87.	3.283	2186.	102.	39992.	0.299	8.	0.	430.	45.	18.	1.280	90.
850-1	4.161	1.939	651.	3.696	1721.	431.	3050.	0.084	2.	0.	500.	510.	120.	1.480	375.
3802-3	0.933	0.713	156.	7.795	4157.	126.	1071.	0.376	9.	0.	1400.	255.	2.	0.880	75.
850-6	18.244	0.606	877.	8.248	1716.	2115.	253.	0.072	7.	0.	360.	507.	270.	0.500	950.
3802-2	2.398	2.542	525.	9.853	1513.	238.	353.	0.297	3.	0.	2500.	268.	2.	0.340	85.
850-7	2.260	1.682	309.	6.377	400.	265.	0.	0.037	4.	0.	970.	570.	90.	1.580	465.
718-1	3.777	0.665	403.	3.765	1345.	498.	417.	0.073	3.	0.	350.	530.	18.	1.150	65.
850-3	1.114	0.137	139.	3.320	562.	128.	0.	0.060	3.	0.	560.	357.	18.	1.580	50.
850-5	13.703	4.774	1010.	8.519	679.	1708.	612.	0.069	0.	2.	530.	568.	260.	1.010	1200.
3802-1	1.014	1.517	256.	9.317	1500.	136.	148.	0.195	8.	0.	3200.	387.	2.	1.450	105.
742-2	1.600	0.546	195.	6.522	1238.	186.	630.	0.298	3.	0.	820.	144.	30.	0.790	105.
401-5	0.814	0.370	193.	4.582	1741.	87.	5772.	0.184	0.	0.	370.	313.	2.	1.330	110.
742-4	0.611	0.210	146.	3.322	829.	79.	120.	0.064	0.	5.	730.	76.	25.	1.360	85.
718-2	2.113	1.990	292.	5.190	727.	94.	100.	0.097	0.	0.	720.	466.	50.	1.320	630.
731-2	0.082	0.093	503.	2.616	923.	14.	4028.	0.115	31.	13.	35.	73.	50.	0.128	35.
850-2	2.456	1.579	356.	2.863	1578.	323.	3478.	0.078	0.	0.	230.	312.	90.	1.260	60.
402-1	0.064	0.059	80.	2.283	1124.	8.	837.	0.085	4.	0.	135.	65.	2.	1.260	55.
731-1	0.093	0.114	352.	2.174	1417.	25.	12913.	0.667	12.	0.	50.	82.	50.	0.052	18.
742-3	0.196	0.106	164.	3.190	1032.	39.	994.	0.152	0.	0.	280.	130.	50.	0.178	55.
720-2	0.320	0.170	117.	3.327	2488.	42.	1818.	0.288	5.	0.	185.	448.	40.	1.280	55.
3800-1	0.681	0.324	144.	2.787	6135.	80.	39996.	0.827	7.	0.	90.	65.	30.	0.790	50.
829-1	0.083	0.091	40.	3.064	672.	17.	2738.	0.084	0.	0.	280.	123.	40.	1.280	65.
900-13	5.628	2.146	589.	6.782	1885.	693.	1543.	0.169	3.	0.	1050.	430.	270.	1.380	240.
720-1	0.870	4.690	678.	10.116	651.	126.	106.	0.086	0.	0.	1750.	347.	80.	1.390	2100.
900-12	2.591	1.172	167.	3.142	885.	63.	256.	0.072	0.	0.	1050.	452.	100.	1.350	110.
900-16	1.024	3.753	617.	7.905	358.	141.	413.	0.044	3.	0.	2000.	297.	140.	1.390	495.
900-17	1.394	0.843	1748.	6.090	1018.	107.	245.	0.256	5.	0.	3400.	561.	140.	1.360	1050.
900-10	0.790	0.373	166.	4.366	821.	84.	1066.	0.074	0.	5.	1020.	329.	110.	1.360	130.
900-11	2.902	1.280	476.	3.678	808.	248.	3077.	0.070	0.	0.	840.	504.	195.	1.350	215.
731-3	1.958	0.720	207.	6.857	1772.	217.	650.	0.306	3.	0.	450.	276.	62.	1.390	95.
825-1	3.010	2.280	354.	8.560	1170.	370.	692.	0.138	3.	0.	750.	536.	110.	1.340	1350.
825-2	0.170	0.092	55.	2.366	505.	12.	3589.	0.073	2.	9.	320.	36.	25.	1.310	60.
829-2	0.274	0.076	69.	4.375	1000.	21.	0.	0.152	5.	0.	390.	151.	50.	1.380	90.
700-1	0.506	1.315	315.	7.284	2704.	61.	836.	0.391	5.	11.	460.	507.	2.	0.120	115.
716-1	3.476	0.303	362.	4.893	1183.	435.	183.	0.190	8.	5.	380.	493.	80.	1.540	80.

900-15	4.919	2.057	1028.	8.907	1331.	633.	94.	0.172	0.	0.	3200.	330.	110.	0.780	95.
900-14	3.003	0.749	343.	2.578	2446.	373.	1432.	0.177	5.	0.	160.	180.	50.	1.110	35.
900-8	3.094	2.240	1277.	4.870	4022.	374.	5340.	0.541	10.	6.	1200.	486.	240.	0.104	70.
900-9	3 752	2.924	531.	4.303	4323.	477.	21003.	0.367	7.	7.	390.	344.	180.	0.114	80.
900-7	1.743	0.357	223.	4.942	2566.	241.	5749.	0.292	6.	0.	360.	261.	80.	0.800	65.
700-3	7.926	1.268	2264.	19.210	294.	1106.	665.	0.044	2.	0.	1200.	550.	300.	0.345	4950.
870-2	0.116	0.087	77.	2.507	169.	13.	0.	0.029	3.	0.	280.	68.	2.	1.470	30.
700-2	0.026	0.055	65.	2.948	428.	0.	38.	0.041	3.	10.	150.	99.	2.	1.460	45.
870-1	0.046	0.078	54.	2.208	480.	0.	0.	0.039	4.	0.	140.	60.	2.	1.440	30.
812-1	2.444	0.988	534.	3.814	976.	302.	2637.	0.145	2.	0.	1700.	346.	62.	0.146	50.
701-1	0.508	0.163	84.	2.022	3843.	52.	24169.	0.644	8.	0.	25.	258.	2.	0.098	50
809-4	3.812	1.055	456.	7.327	1009.	483.	186.	0.144	4.	0.	820.	403.	100.	1.380	165.
870-3	0.078	0.028	21.	3.134	478.	22.	0.	0.042	0.	0.	420.	13.	2.	1.560	45.
900-6	0.949	0.386	260.	1.798	1506.	126.	8526.	0.291	4.	0.	170.	188.	195.	0.084	30.
900-3	1.733	1.591	804.	3.843	1928.	243.	882.	0.320	5.	0.	1600.	364.	6.	0.126	50.
900-4	0.517	0.441	150.	9.442	977.	73.	252.	0.073	9.	9.	1400.	347.	300.	1.390	150.
809-3	2.114	2.408	662.	4.816	1613.	269.	0.	0.142	8.	0.	500.	707.	110.	1.320	800.
708-2	8.258	0.405	288.	8.623	1317.	981.	260.	0.140	8.	0.	70.	588.	240.	1.620	110.
809-1	0.200	0.420	272.	6.246	1426.	21.	3693.	0.138	4.	0.	1000.	415.	50.	1.190	100.
812-2	0.367	0.120	50.	3.140	924.	53.	301.	0.083	0.	0.	150.	84.	40.	0.860	45.
809-2	1.492	1.589	601.	8.293	2289.	170.	463.	0.317	8.	0.	1050.	371.	100.	0.880	110.
900-5	0.431	0.286	155.	3.087	1666.	28.	73.	0.188	4.	0.	430.	369.	62.	0.910	45.
900-1	4.805	0.428	293.	2.105	942.	599.	2286.	0.069	1.	0.	230.	323.	10.	0.210	20.
808-1	0.616	0.487	177.	4.365	1969.	50.	548.	0.198	3.	0.	680.	425.	62.	1.360	75.
708-3	0.825	0.510	131.	4.922	12797.	59.	4136.	0.588	10.	0.	5.	236.	2.	1.410	80.
900-2	5.508	2.395	752.	3.897	1050.	637.	8441.	0.121	0.	0.	2500.	423.	18.	0.194	40.
709-1	0.058	0.030	61.	3.315	725.	0.	48.	0.081	3.	0.	500.	66.	2.	1.580	45.
708-1	0.173	0.242	96.	4.685	1830.	23.	690.	0.183	10.	0.	180.	315.	2.	1.510	70.
708-4	0.646	0.982	210.	6.613	985.	58.	4359.	0.238	6.	0.	500.	255.	2.	0.260	65.
2900-2	0.720	0.795	601.	4.631	1451.	90.	162.	0.322	5.	0.	750.	482.	6.	0.980	75.
2901-1	0.970	5.350	290.	7.679	1928.	143.	1120.	0.214	0.	0.	1100.	375.	2.	0.680	90.
2901-4	0.493	0.318	71.	2.971	2846.	70.	102.	0.217	10.	0.	130.	146.	2.	0.670	35.
3001-6	1.001	0.292	167.	3.422	938.	87.	7082.	0.412	6.	0.	290.	400.	8.	0.850	35.
737-1	0.170	0.080	40.	2.077	7161.	17.	10175.	0.207	0.	0.	200.	24.	40.	1.320	55.
3000-4	0.476	0.132	86.	1.918	1155.	60.	2416.	0.081	0.	0.	50.	81.	10.	0.970	25.
3001-5	4.281	0.378	265.	6.854	794.	540.	777.	0.054	0.	0.	600.	366.	18.	1.250	90.
3001-7	5.291	1.586	731.	7.036	711.	650.	90.	0.085	0.	0.	1000.	304.	25.	0.230	65.
3001-3	0.164	0.660	50.	3.008	1520.	15.	1009.	0.083	9.	0.	260.	118.	6.	0.860	30.
3001-4	1.789	1.730	616.	4.933	1206.	230.	437.	0.078	0.	0.	3100.	345.	18.	1.260	95.
3104-9	4.533	2.819	1006.	18.831	606.	600.	610.	0.140	0.	0.	790.	307.	6.	1.160	365.
3104-7	0.301	0.227	83.	1.609	823.	38.	5099.	0.267	4.	0.	5.	110.	2.	0.096	35.
3104-10	0.702	0.314	257.	4.450	617.	32.	1012.	0.098	0.	0.	310.	244.	2.	1.340	75.
3001-2	0.963	1.052	207.	5.300	1261.	121.	7202.	0.154	5.	0.	110.	317.	20.	0.940	165.
2901-5	0.063	0.038	64.	1.292	452.	0.	10871.	0.382	4.	10.	5.	28.	2.	0.020	15.
3104-8	2.360	3.527	472.	9.224	713.	305.	2425.	0.099	3.	0.	330.	356.	6.	0.780	165.
2900-1	7.171	0.771	1171.	5.120	2743.	862.	9762.	0.410	0.	0.	3000.	362.	6.	0.120	60.
3104-6	0.731	0.595	235.	4.783	854.	86.	481.	0.107	5.	0.	150.	339.	10.	1.420	160.
2902-2	27.271	1.767	427.	11.024	1087.	273.	1405.	0.169	5.	0.	2700.	508.	2.	1.340	140.
3104-5	2.517	2.816	800.	11.887	1801.	320.	142.	0.186	4.	0.	820.	315.	25.	0.272	145.
2902-5	0.362	2.258	1113.	11.735	1235.	49.	200.	0.138	0.	0.	1800.	197.	2.	1.340	190.
3104-1-1	11.723	3.955	2517.	11.521	858.	1330.	582.	0.039	0.	0.	700.	288.	240.	1.220	3600.
2902-1	27.522	1.870	347.	12.355	1196.	349.	710.	0.236	5.	0.	2200.	413.	2.	1.370	135.

2902-3	6.693	0.669	367.	11.841	1077.	829.	945.	0.188	10.	0.	1600.	354.	6.	1.360	145.
3104-3	12.301	2.771	2291.	15.742	787.	1453.	1086.	0.046	0.	0.	800.	295.	340.	1.370	2550.
3104-1	14.625	3.731	1036.	9.411	1786.	1831.	6851.	0.179	5.	0.	480.	265.	40.	1.240	165.
3104-4	16.902	3.248	1624.	10.099	490.	2317.	631.	0.028	1.	0.	380.	317.	480.	1.190	1650.
2902-4	0.399	0.120	54.	1.994	8646.	59.	9225.	0.570	6.	0.	5.	40.	2.	0.066	20.
3104-2	14.119	4.111	1644.	12.840	597.	1662.	126.	0.049	5.	0.	450.	306.	200.	0.980	1200.
2903-1	1.925	0.654	174.	3.084	8490.	248.	8865.	0.546	0.	0.	95.	97.	2.	0.700	50.
3010-1	1.229	0.562	133.	9.440	3244.	137.	1420.	0.241	8.	0.	280.	255.	10.	1.260	100.
3000-1	0.269	0.185	108.	3.446	16830.	29.	109895.	0.773	0.	0.	280.	233.	6.	0.102	90.
3000-3	6.253	2.093	254.	12.871	1188.	483.	516.	0.185	18.	0.	1450.	353.	25.	1.270	155.
2904-1	0.253	0.532	56.	3.276	6357.	28.	46467.	1.117	5.	0.	270.	324.	2.	1.060	65
2904-2	2.298	0.494	215.	4.196	5369.	251.	28208.	0.872	8.	0.	600.	487.	2.	0.124	60.
2955-3	2.429	0.116	296.	5.003	2147.	264.	1422.	0.167	6.	0.	620.	349.	30.	0.780	95.
2955-2	2.341	1.867	193.	6.197	1359.	285.	930.	0.201	13.	0.	560.	309.	25.	1.240	135.
2955-1	1.422	2.083	187.	7.047	1552.	142.	2030.	0.076	5.	0.	1100.	279.	6.	0.970	85.
3016-4	0.289	0.665	44.	3.058	8251.	40.	60733.	0.460	3.	0.	900.	45.	10.	1.340	80.
2910-8	0.442	0.610	65.	8.146	823.	61.	247.	0.061	6.	0.	1250.	244.	2.	1.340	90.
2905-3	0.284	0.304	77.	3.041	9390.	10.	37580.	0.434	2.	0.	150.	95.	2.	0.850	40.
2910-6	1.692	2.959	991.	16.882	3233.	224.	10832.	0.410	3.	0.	1800.	304.	2.	0.920	1350.
2910-7	0.722	2.209	975.	14.492	2138.	101.	870.	0.347	8.	0.	950.	384.	2.	1.040	1400.
2905-2	2.875	3.997	376.	9.511	2040.	399.	7110.	0.300	6.	0.	1400.	347.	2.	1.040	125.
2906-5	3.439	4.610	512.	9.908	398.	482.	152.	0.057	8.	0.	4200.	410.	50.	1.400	315.
2906-4	3.248	2.701	2367.	16.732	779.	435.	1184.	0.140	4.	0.	16000.	323.	25.	1.360	355.
2905-1	35.521	4.629	983.	13.625	1788.	442.	8616.	0.227	0.	0.	9000.	350.	2.	0.760	110.
2906-2	13.124	2.271	1035.	16.545	821.	1710.	3138.	0.075	3.	0.	2450.	325.	70.	0.320	330.
2906-3	0.442	0.378	215.	13.873	1049.	54.	4857.	0.145	5.	0.	1000.	226.	2.	0.970	90.
2911-6	4.967	0.709	2047.	1.348	238.	652.	128.	0.026	0.	0.	9100.	284.	40.	1.130	350.
2910-4	0.186	0.161	96.	6.097	2006.	12.	4402.	0.303	5.	5.	1450.	44.	2.	1.200	55.
2915-1	4.499	2.997	758.	6.505	1365.	552.	7593.	0 812	6.	0.	2300.	388.	2.	0.112	90.
2910-5	1.358	3.539	491.	14.758	439.	181.	1680.	0.079	0.	0.	5300.	235.	6.	0.860	160.
2910-2	9.452	3.581	530.	12.400	7588.	1368.	24143.	0.540	4.	0.	4200.	253.	40.	0.224	75.
2911-4	2.570	5.583	221.	10.115	4237.	396.	5623.	0.423	4.	0.	690.	360.	10.	1.150	190.
2918-1	3.033	6.324	716.	8.431	858.	379.	1180.	0.088	0.	0.	1500.	325.	30.	1.330	210.
2910-1	15.165	5.313	750.	6.949	852.	2065.	5283.	0.194	8.	0.	3850.	310.	270.	0.296	165.
2914-1	0.603	2.997	196.	12.609	2799.	97.	3126.	0.105	10.	0.	2000.	294.	2.	1.340	525.
2912-17	3.525	0.195	419.	6.059	2113.	449.	617.	0.375	2.	0.	2200.	83.	6.	0.236	60.
2912-18	0.207	0.232	89.	8.391	3920.	23.	4133.	0.285	6.	0.	1000.	65.	2.	1.330	85.
2911-2	10.249	6.903	1876.	6.658	667.	1603.	162.	0.089	18.	0.	3100.	306.	220.	1.160	460.
2911-1	12.728	3.648	2504.	14.120	799.	1736.	1111.	0.092	10.	0.	16500.	151.	70.	1.390	110.
2912-16	2.498	0.829	243.	7.019	6511.	322.	3511.	0.364	0.	0.	800.	109.	2.	1.330	65.
2912-15	0.487	0.142	164.	3.368	1108.	73.	675.	0.147	4.	11.	110.	34.	2.	1.230	40.
2912-14	9.728	3.524	734.	15.313	655.	1453.	477.	0.070	3.	0.	2100.	284.	18.	1.090	290.
2912-13	0.134	0.020	40.	0.937	534.	39.	15698.	0.235	0.	0.	30.	0.	2.	0.011	15.
2912-12	2.859	0.295	701.	8.719	1666.	368.	190.	0.178	9.	0.	3000.	30.	2.	1.340	80.
2912-11	12.947	5.054	1862.	7.798	1781.	1814.	2504.	0.248	5.	0.	3000.	321.	10.	1.130	120.
2912-9	10.274	2.998	1023.	10.764	2597.	1696.	7496.	0.220	5.	0.	7000.	212.	10.	1.030	90.
2912-10	14.804	0.362	1664.	7.556	1096.	2157.	813.	0.090	13.	0.	2100.	59.	110.	0.220	75.
2916-9	0.343	0.308	201.	2.556	1661.	41.	4504.	0.192	2.	0.	360.	14.	2.	0.160	25.
2916-8	0.532	0.258	85.	3.350	1642.	72.	481.	0.246	4.	0.	90.	7.	4.	0.098	30.
2912-8	1.684	4.938	975.	9.263	196.	264.	916.	0.035	3.	0.	3600.	293.	2.	1.050	490.
2916-7	9 825	3 517	1525	9 645	1268.	1509	4864	0 161	19	0	1700	122.	40.	0 084	125
2912-6	1.592	0.775	538.	5.042	933.	188.	1754.	0.104	1.	4.	7100.	32.	2.	0.490	40.
2912-5	2.317	0.891	390.	8.946	1338.	288.	1792.	0.194	13.	12.	3800.	51.	2.	1.350	95.
2912-4	17.334	2.840	1369.	7.319	2730.	2457.	6633.	0.244	15.	0.	3500.	112.	30.	0.188	75.

TABLE 2. Means and Standard Deviations Determined Graphically[1] for Partitioned Element Populations in Granodiorite-Hosted Vein Vein Material[2] in the Lass Vein System, Beaverdell Mine Area, South-Central British Columbia

Element	Population A[3]				Populations[3] B, B'			
	%	b	b+s	b-s	%	b	b+s	b-s
Zn %	55	3.76	9.12	1.40	45	0.38	1.40	0.11
Cd ppm	55	457	1288	178	45	43	234	10
Cu ppm	70	513	1202	195	30	76	126	45
Sb ppm	10	1318	2138	794	90	79	162	38
Pb %	38	3.00	4.30	2.09	37	0.54	1.02	0.29
					25	0.12	0.35	0.05
Fe %	60	8.99	13.49	5.94	40	3.72	6.84	2.20
Ag ppm	67	427	457	269	18	105	174	68
					15	34	135	8
Au ppb	90	646	2239	191	10	15	51	4
As %	72	1.20	1.70	0.86	28	0.13	0.24	0.07
Mn ppm	30	5012	10233	2570	70	1202	2291	617
Mg %	70	0.25	0.45	0.14	30	0.08	0.12	0.05
Hg ppb					100	20	124	3
Ca ppm					100	1143	14962	87
Co ppm [4]					100	1.75	9.90	0.31

1. Partitioned into populations on logarithmic probability plots, using the procedures of Sinclair (1976).
2. There are 209 samples in this group.
3. b is antilog of mean of logtransformed data; b+s is antilog of mean plus one standard deviation of logtransformed data; b-s is antilog of mean minus one standard deviation of logtransformed data.
4. 24% of the Co values were below the analytical detection limit.

TABLE 3. Correlation Matrix for Granodiorite-Hosted Vein Material from the Lass Vein System, Beaverdell Mine Area, South-Central British Columbia

```
-CORRELATION MATRIX
             ZN        CD        CU        SB        PB        FE        AG        AU        AS        HG        MN
   ZN      1.0000
   CD      0.8086    1.0000
   CU      0.7463    0.6175    1.0000
   SB      0.4972    0.4023    0.6023    1.0000
   PB      0.7567    0.6310    0.7267    0.6228    1.0000
   FE      0.6195    0.5170    0.5879    0.6875    0.7283    1.0000
   AG     -0.0504    0.0106    0.0178    0.0271    0.0602    0.1464    1.0000
   AU      0.0299    0.0300    0.0592   -0.0479    0.0314    0.0230   -0.0259    1.0000
   AS      0.0221    0.0333    0.0690    0.0083    0.1299    0.0729    0.2899   -0.0057    1.0000
   HG      0.0547    0.0389    0.0007    0.0507   -0.0071   -0.0003   -0.1975   -0.0040   -0.0882    1.0000
   MN     -0.0120    0.0368   -0.1959   -0.1614   -0.0176   -0.0426   -0.0174   -0.0552    0.0819    0.1077    1.0000
   CA      0.0472    0.0174    0.0094   -0.1356    0.0591   -0.0616   -0.0052    0.0124    0.0507    0.0429    0.4275
   MG     -0.1026   -0.0692   -0.2099   -0.3254   -0.0782   -0.1123   -0.0472   -0.0560    0.0613    0.0794    0.7663
   CO     -0.0196   -0.0090   -0.0094   -0.1760   -0.0330    0.0121   -0.0157   -0.0441    0.0519   -0.0360    0.1513
   TH      0.0506    0.0283    0.0893    0.1393    0.0004    0.0545    0.0329    0.0695   -0.0785    0.1206   -0.3288
-CORRELATION MATRIX
             CA        MG        CO        TH
   CA      1.0000
   MG      0.5183    1.0000
   CO      0.0054    0.3052    1.0000
   TH     -0.2336   -0.3527   -0.2295    1.0000
```

N=209

Values are significant at the 1% level, if greater than 0.176 and significant at the 0.1% level if greater than 0.223; all data are logtransformed except for TH (thickness).

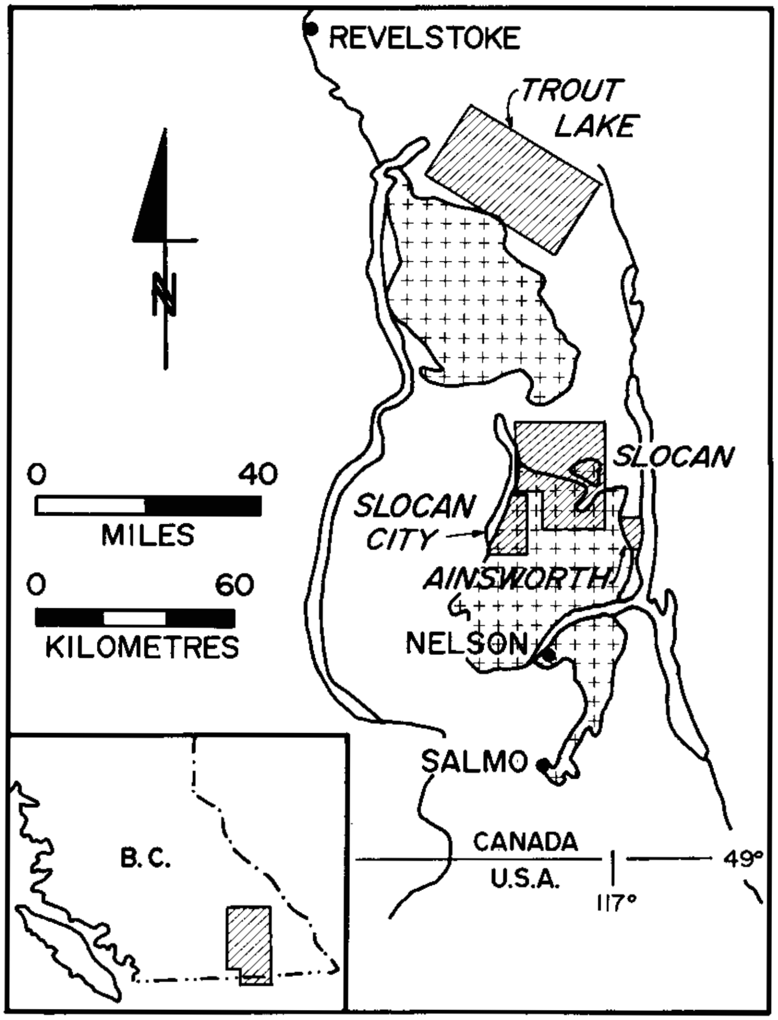

Figure 87. Generalized locations of Ainsworth, Slocan City, Slocan, and Trout Lake mining camps, southeastern British Columbia.