Algo
824667 → IDC

INTERPRETATION OF LEAD ISOTOPE ANALYSES OF THE SCARLET DEPOSIT, ADAMS PLATEAU AREA

The results of lead isotopic analyses of samples from the Scarlet deposit have been compared to data from other deposits in the Adams Plateau area. These include both data reported in Goutier (1986), and more recent analyses by Anne Andrew.

Goutier defined three clusters of lead isotopes from the Adams Plateau deposits, based on differences in age and genesis of the mineralization. Cluster 1 represents Devonian to early Carboniferous volcanogenic deposits cogenetic with the host rocks of units EBA and EBF of the Eagle Bay Formation (Schiarriza and Preto, 1984). Cluster 2 is interpreted as being of Upper Triassic age. Several types of mineralization plot in this cluster so that application of a unique interpretation is not possible. These types include stratiform, cogenetic with host rocks, replacement, and veins. Cluster 3 represents middle Cretaceous mineralization in veins associated with the Baldy batholith. Some outliers plot between these clusters.

Lead isotope ratios from Samatosum plot in Cluster 1, with Homestake and Rea Gold (Figures 1 and 2, after Goutier, 1986). There appears to be some variation within the deposit, but it is clearly of Devonian to early Carboniferous age. Peavine Creek also plots close to cluster 1, particularly on the $^{208}Pb/^{204}Pb$ versus $^{206}Pb/^{204}Pb$ diagram. Analyses from this deposit should be

repeated, as it shows a large discrepancy in $^{207}Pb/^{204}Pb$ ratio. Peavine Creek is in the Vavenby area, unlike the other deposits that plot in this cluster. It is the only deposit analysed from this northern part of Goutier's study area that has such non-radiogenic lead isotopes, although the volcanogenic deposit Birk Creek is just south of the margin of the Baldy batholith.

Data from Scarlet, Tinkirk, and Snow lie between clusters 2 and 3 on the standard lead isotope plots (Figures 1 and 2, after Goutier, 1986). Outlying analyses between clusters 2 and 3 are not easily interpreted (Goutier 1986). The vein deposits reported in Goutier (1986) that plot between clusters 2 and 3 are all located in the Vavenby area, fairly close to the margins of the Baldy batholith. They are Foghorn, Rouge, and Tindall. Tinkirk, and Snow are also in this area. Scarlet formed as sulphide pods hosted in a quartz vein that cuts mudstones and wackes of the Eagle Bay Formation. Unlike the other vein deposits that plot between clusters 2 and 3 Scarlet is spatially removed from the Baldy batholith, far enough that it is unlikely to be directly related to the intrusion. The lead isotope signature from Scarlet is not like that of Samatosum, despite geographic proximity and having the same Devonian to Early Carboniferous host rock. This confirms field observation (Pirie, pers. comm.) that Scarlet is a later deposit than Samatosum.

The lead signature from the vein deposits that plot between clusters 2 and 3 is probably not related to mixing with lead from

the batholith, based on the positions of the clusters on the lead diagrams. The means of both clusters 2 and 3 on the $^{207}Pb/^{204}Pb$ versus $^{206}Pb/^{204}Pb$ diagram (Figure 1) lie below both the shale curve (Godwin and Sinclair, 1982) and the remodelled curve (Goutier, 1986). Thus if the vein mineralization were the result of mixing between host rock and batholith lead, the lead isotope data should lie along a line below the growth curves. It might even have a negative slope. The pattern that appears in Figure 1 is a non-linear cluster of data points, most of which are between or above the two growth curves. The radiogenic isotopic compositions might reflect incorporation of a component generated by in situ decay of uranium and thorium mineralization hosted in a U-rich member of the Eagle Bay Formation. Goutier considers that the mixing might have occurred as a result of fluid movement related to Jurassic deformation associated with the Columbian Orogeny.

In conclusion, lead isotope analyses from Scarlet show that it is not related to Samatosum, which is Devonian to early Carboniferous in age. Scarlet might be Late Triassic or Jurassic in age. The lead in the deposit almost certainly has a component derived from uranium-rich host rocks.

References

Godwin, C.I. and Sinclair, A.J., 1982. Average lead isotopic growth curves for Shale-hosted Zn-Pb deposits in the Canadian Cordillera. Economic Geology, 77, pp. 675-690.

Goutier, F.M., 1986. Galena lead isotope study of mineral deposits in the Eagle Bay Formation, Southeastern

British Columbia. Unpub. M.Sc. thesis, the University of British Columbia.

Richards, J.R., Fletcher, I.R., and Blockley, J.G., 1981. Pilbara galenas: Precise isotopic assay of the oldest Australian leads; model ages and growth curve implications. Mineralia Deposita, 6, pp.7-30.

Schiarriza, P.A. and Preto, V.A., 1986. Geology of the Eagle Bay Formation between the Raft and Baldy batholiths (82M/5,11,12). B.C. Ministry of Energy Mines and Petroleum Resources Geological Fieldwork 1985, paper 1986-1, pp.89-94.

Janet E Gabites

Janet E. Gabites
Research Scientist

Table 1. Lead Isotope Data from Deposits in the Adams Plateau Area.

Sampleno	Deposit	$^{206}Pb/^{204}Pb$	% error	$^{207}Pb/^{204}Pb$	% error	$^{208}Pb/^{204}Pb$	% error
30121-001	Scarlet	19.231	0.00	15.708	0.00	38.998	0.00
30121-002	Scarlet	19.208	0.00	15.707	0.00	38.969	0.00
30121-003	Scarlet	19.196	0.00	15.699	0.00	39.021	0.00
30121-AVG	Scarlet	19.215	0.00	15.705	0.00	38.996	0.00
30974-001	Tinkirk	19.287	0.00	15.717	0.00	39.089	0.00
30975-002	Snow	19.298	0.01	15.721	0.00	39.080	0.01
30976-001*	Peavine Ck	18.822	0.00	15.743	0.00	38.672	0.00
30976-002*	Peavine Ck	18.829	0.00	15.734	0.00	38.648	0.00
30976-AVG*	Peavine Ck	18.826	0.00	15.738	0.00	38.660	0.00
30977-001*	Samatosum	18.934	0.01	15.704	0.00	38.920	0.03
30977-002*	Samatosum	18.941	0.01	15.695	0.00	38.812	0.02
30977-003*	Samatosum	18.898	0.01	15.685	0.00	38.738	0.01
30977-004*	Samatosum	18.864	0.01	15.658	0.00	38.654	0.02
30977-005*	Samatosum	18.885	0.00	15.694	0.00	38.761	0.00
30977-006*	Samatosum	18.889	0.00	15.671	0.00	38.701	0.00
30977-007*	Samatosum	18.923	0.00	15.714	0.00	38.817	0.00
30977-AVG*	Samatosum	18.905	0.05	15.689	0.02	38.772	0.02

	$^{207}Pb/^{206}Pb$	% error	$^{208}Pb/^{206}Pb$	% error
30121-001	0.81679	0.00	2.0279	0.00
30121-002	0.81772	0.00	2.0287	0.00
30121-003	0.81785	0.00	2.0327	0.00
30121-AVG	0.81745	0.00	2.0298	0.00
30974-001	0.81491	0.01	2.0267	0.01
30975-002	0.81462	0.02	2.0250	0.02
30976-001	0.83634	0.00	2.0546	0.01
30976-002	0.83567	0.01	2.0526	0.01
30976-AVG	0.83601	0.01	2.0536	0.01
30977-001	0.82942	0.13	2.0555	0.13
30977-002	0.82861	0.08	2.0491	0.01
30977-003	0.82997	0.01	2.0498	0.00
30977-004	0.83005	0.01	2.0491	0.01
30977-005	0.83105	0.01	2.0525	0.01
30977-006	0.82966	0.01	2.0488	0.00
30977-007	0.83044	0.02	2.0513	0.02
30977-AVG	0.82989	0.00	2.0509	0.00

AVG = average for deposit.
Analyst: J. Gabites; A. Andrew where marked with *.
Analyses normalised to values of Broken Hill Galena Lead Standard reported in Richards et al. (1981).

Figure I

$^{207}Pb/^{204}Pb$ vs $^{206}Pb/^{204}Pb$ diagram for deposits hosted by the Eagle Bay Formation using data from Table 3.3. Filled symbols denote deposits grouped in specific clusters; open symbols are outliers. Deposits in cluster 1 to 3 are plotted with different symbols. Bars represent ± 1 standard error around the mean of the cluster. The average growth curves shown are the 'shale' curve of Godwin and Sinclair (1982) and the remodeled shale curve (t_2 = 2.0Ga, u = 12.16±.08).