



## GALENA LEAD ISOTOPE RESEARCH AT THE UNIVERSITY OF BRITISH COLUMBIA\*

By C. I. Godwin and J. E. Gabites  
Department of Geological Sciences,  
The University of British Columbia

**KEYWORDS:** Lead isotope, Canadian Cordillera, metallogeny, deposit models, LEADTABLE.

The senior author directs research by the Lead Isotope Research Group at The University of British Columbia (U.B.C.), in collaboration with R.L. Armstrong's Geochronology Laboratory. Emphasis is on interpretation of galena lead isotopes to support decisions in mineral exploration. Research also contributes to more theoretical understanding of metallogeny in British Columbia.

Projects continuing from previous years are: (1) acquiring a library and computer-based file of galena samples from as many deposits as possible in the Canadian Cordillera, (2) developing case histories with application to exploration, and (3) continuing research in models relevant to the study of metallogeny. A. Andrew was recently appointed as a Research Associate with funding from LITHOPROBE, and is continuing her isotopic studies of Wrangellia. Four papers from her completed doctoral thesis (Andrew, 1987) have been submitted for publication (Andrew and Godwin, 1988a, b, c, d).

Over the past year our research group has completed a computer-based 'LEADTABLE' for publication by the British Columbia Ministry of Energy, Mines and Petroleum Resources (Godwin *et al.*, in preparation). LEADTABLE is a (dBase III+) file containing: sample numbers; deposit names; details of collector; location by latitude and longitude, NTS and MINFILE number; details of deposit type, age of host rock and tectonic terrane; geological comments; details of analyst and analytical quality; and galena lead isotope ratios with errors. Most of the analyses listed are from U.B.C., at various times and with varying degrees of precision. About 800 of these are new, high-precision analyses by Gabites. The remainder are from the literature. Our library of galena currently consists of over 1700 samples, about three quarters of which are from more than 600 deposits in British Columbia. Individuals with galena samples from deposits, particularly from recently discovered or remote showings, are urged to submit them to the authors.

Approximately 250 galena samples have been analysed during the year. These isotope data complete several case histories, continue ongoing projects, and provide preliminary results for new projects. The projects for which analyses have been completed (but not yet published) include interpretation of galena lead isotopes from deposits in (1) the Stewart area, northwestern British Columbia (with D.J. Alldrick; *see Alldrick et al.*, 1987), (2) the Bridge River gold camp, southwestern British Columbia (with C.H.B. Leitch, in conjunction with K.M. Dawson, Geological Survey of

Canada; *see Leitch and Godwin, 1988*), and (3) the Toadogone camp (with T.G. Schroeter).

Ongoing camp projects involve galena lead isotope analyses from:

- (1) The Gambier Group centred on the International Maggie Mines Ltd. property in southwestern British Columbia (with D.G. Reddy, *see Reddy et al.*, 1987, 1988). He will compare Gambier Group deposits with those in the Harrison Lake Group. Old data indicate much similarity between these areas.
- (2) The silver-zinc-tin deposits in the Midway area, northern British Columbia (with J.A. Bradford, J.L. Nelson and K.M. Dawson). Preliminary work by Dawson, Godwin and Gabites (1985) suggests that Cretaceous-Tertiary deposits generated within the Cassiar-Pelly platform are distinctly different from those generated by events related to the Cassiar batholith.
- (3) The Dome Mountain area, central British Columbia (with D.G. MacIntyre and P.J. Desjardins). The galena here should have a lead isotopic fingerprint similar to galena in the Stewart area (*see Alldrick et al.*, 1987), as the deposits are hosted in the same Hazelton Group volcanic rocks.
- (4) The Oliver area, southern British Columbia (with J.K. Russell). A hypothesis was put forward (Russell, personal communication, 1987) that metamorphism and deformation in the Permian Kobau Group and formation of vein deposits in the Oliver camp preceded intrusion of the Jurassic Oliver granodiorite. If this is the case, deposits related to the batholith should have a different lead isotope signature from deposits in the metamorphic rocks. In fact, preliminary isotopic analysis of galena shows only minor differences between the deposits, indicating that all of the mineralization is related to the intrusives.

Two new, related projects were initiated this summer. These involve galena lead isotope analysis and interpretation of mineralization from deposits in the Rosslund Group (with T. Höy and K.P.E. Andrew), and in veins in the Nelson batholith (with D.A. Brown and J.M. Logan). Partial results from the latter are reported in this volume (Logan *et al.*, 1988, this volume).

Research undertaken by our group covers a wide range of projects, many in collaboration with U.B.C. students, and geologists with the Geological Survey Branch of the Ministry of Energy, Mines and Petroleum Resources and Geological Survey of Canada. There is a growing acceptance and recog-

\* This project is a contribution to the Canada/British Columbia Mineral Development Agreement. British Columbia Ministry of Energy, Mines and Petroleum Resources, Geological Fieldwork, 1987, Paper 1988-1.

dition of the use of lead isotope research in both regional and detailed studies. Analysis of lead isotopes in galena is increasingly accepted as a tool in regional mapping and in studies of metallogeny.

Support from the British Columbia Ministry of Energy, Mines and Petroleum Resources, the Canada/British Columbia Mineral Development Agreement and the British Columbia Science Council is gratefully acknowledged. Many geologists from the ministry have contributed galena specimens and have participated in studies that are ongoing and reported here.

## REFERENCES

- Alldrick, D.J., Gabites, J.E. and Godwin, C.I. (1987): Lead Isotope Data from the Stewart Mining Camp, *B.C. Ministry Energy, Mines and Petroleum Resources*, Geological Fieldwork, 1986, Paper 1987-1, pages 93-102.
- Andrew, A. (1987): Lead and Strontium Isotope Study of Five Volcanic and Intrusive Rock Suites and Related Mineral Deposits, Vancouver Island, British Columbia, *The University of British Columbia*, Unpublished Ph.D. Thesis, 254 pages.
- Andrew, A. and Godwin, C.I. (1988a): Isotope Geochemistry of the Sicker Group, Vancouver Island, British Columbia, *Canadian Journal of Earth Sciences*, Submitted.
- Andrew, A. and Godwin, C.I. (1988b): Isotope Geochemistry of the Karmutsen Formation, Vancouver Island, British Columbia, *Canadian Journal of Earth Sciences*, Submitted.
- Andrew, A. and Godwin, C.I. (1988c): Isotope Geochemistry of the Tertiary Catface Intrusions, Vancouver Island, British Columbia, *Canadian Journal of Earth Sciences*, Submitted.
- Andrew, A. and Godwin, C.I. (1988d): Isotope Geochemistry of the Bonanza Group Volcanic Rocks and Island Intrusions, Vancouver Island, British Columbia, *Canadian Journal of Earth Sciences*, Submitted.
- Dawson, K.M., Godwin, C.I. and Gabites, J.E. (1985): Lead Isotope Analyses from the Silver-rich Deposits in the Cassiar, Midway and Ketza River Areas of the Northern Cordillera, *Geological Association of Canada, Cordilleran Section, Abstract and Program, Silver '85, Symposium*, pages 5-6.
- Godwin, C.I., Gabites, J.E. and Andrew, A.: LEAD-TABLE: A Galena Lead Isotope Data Base for the Canadian Cordillera, With Notes on How Explorationists Can Use It, *B.C. Ministry of Energy, Mines and Petroleum Resources*, In Preparation.
- Leitch, C.H.B. and Godwin, C.I. (1988): Isotopic Ages, Wallrock Chemistry, and Fluid Inclusion Data from the Bralorne Gold Vein Deposit (92J/15W), *B.C. Ministry of Energy, Mines and Petroleum Resources*, Geological Fieldwork, 1987, Paper 1988-1, This Volume.
- Logan, J.M., Gabites, J.E. and Brown, D.A. (1988): Galena Lead Isotope Characteristics of Mineralization in Kokanee Glacier Provincial Park, Southeastern British Columbia (82F/11, 14), *B.C. Ministry of Energy, Mines & Petroleum Resources*, Geological Fieldwork, 1987, Paper 1988-1, This Volume.
- Reddy, D.G., Ross, J.V. and Godwin, C.I. (1987): Geology of the Hopkins Property, Indian River Area, Southwestern British Columbia (92G/11), *B.C. Ministry of Energy, Mines and Petroleum Resources*, Geological Fieldwork, 1986, Paper 1987-1, pages 43-45.
- Reddy, D.G., Ross, J.V. and Godwin, C.I. (1988): Geology of the Maggie Property, Indian River Area, Southwestern British Columbia (92G/11), *B.C. Ministry of Energy, Mines and Petroleum Resources*, Geological Fieldwork, 1987, Paper 1988-1, This Volume.