

## NATIVE LEAD AT KENO HILL, YUKON

R. W. BOYLE

Geological Survey of Canada, Ottawa K1A 0E8

Recent investigations of the heavy-mineral concentrates from the oxidized zones of the lead-zinc-silver deposits, their overlying soils, and the stream sediments of the Keno Hill area, Yukon (Gleeson & Boyle *in press*) have revealed the occasional occurrence of native lead. The mineral occurs as small (<50 microns) irregularly rounded masses and thin plates; rarely as microscopic dendrites and poorly formed crystals. The most intimate associate in some, but not all, occurrences is litharge which may occur as a thin coating on the lead. Other associates are cerussite, massicot(?), wad, and limonite. Spectrographic analyses of the native lead indicate the presence of strong traces to minor amounts of arsenic and tin and traces of Ag, Ba, Bi, Co, Cu, Ni, and Sb.

The source of the native lead is undoubtedly the lead-zinc-silver lodes in which lead as the element occurs mainly in the hypogene minerals galena, boulangerite, jamesonite, meneghinite, and bournonite (Boyle 1965). The principal supergene lead minerals are cerussite, anglesite, beudantite, bindheimite, and plumbojarosite. Native lead has not yet been observed under the microscope among the hypogene products of mineralization.

According to Palache *et al.* (1944) and Chukhrov (1960) native lead is extremely rare, but the mineral is relatively widespread in both hypogene and supergene environments. The native metal is commonly noted in placer (eluvial) concentrates (Bartikyan 1966).

The origin of the native lead at Keno Hill is uncertain. The mineral may be one of the minor products of the hypogene mineralization from which it finds its way ultimately into the oxidized zones, soils, and stream sediments as a resistate mineral. Alternatively, the mineral may be a reduction product of the oxidation processes of the lead-zinc-silver lodes. During this

process small amounts of lead are mobile as the sulfate, carbonate, and probably also as organic (humic) compounds. Disintegration of the humic ligands in the last type of compounds as a result of oxidation processes would precipitate native lead. Reduction of the sulfate and carbonate, perhaps by reaction with organic compounds, may also have produced the native lead, although this mechanism seems less likely than the oxidation of humic compounds.

It is interesting that four native elements have now been identified in the lodes and their oxidation products at Keno Hill, including native silver, native gold, native zinc (Boyle 1961), and native lead.

A specimen has been filed in the systematic reference series of the National Mineral Collection at the Geological Survey of Canada (No. 12115).

### REFERENCES

- BARTIKYAN, P. M. (1966): Native lead and zinc in the rocks of Armenia. *Zap. Vses. Mineral. Obshchest.* 95, 99-102.
- BOYLE, R. W. (1961): Native zinc at Keno Hill. *Can. Mineral.* 6, 692-694.
- (1965): Geology, geochemistry, and origin of the lead-zinc-silver deposits of the Keno Hill-Galena Hill area, Yukon Territory. *Geol. Surv. Can. Bull.* 111.
- CHUKHROV, F. V. (Principal ed.) (1960): *Minerals, a Guide Book 1*, Izd. Akad. Nauk S.S.S.R., Moscow, 45-47.
- GLEESON, C. F. & BOYLE, R. W. (In Press): Minor and trace element distribution in the heavy minerals of the rivers and streams of the Keno Hill area, Yukon Territory. *Geol. Surv. Can. Pap.*
- PALACHE, C., BERMAN, H. & FRONDEL, C. (1944): *The System of Mineralogy 1*. John Wiley & Sons, New York.

Received July 1976.