CIRQUE BARITE–ZINC–LEAD–SILVER DEPOSIT

(94F/6, 11)

By D. G. MacIntyre

INTRODUCTION

The Cirque claims were staked by the Cyprus Anvil/Hudson's Bay Oil and Gas joint venture in July 1977 to cover a northwest-trending belt of lead-zinc-bearing barite kill zones and gossans near the headwaters of the Paul River. Subsequent work outlined a coincident lead-zinc soil anomaly over 2 kilometres in length. In 1978 additional soil sampling and an electromagnetic survey were done followed by 882 metres of diamond drilling in six holes. Diamond-drill holes 78-1, 78-2, and 78-3 tested the R float showing and 78-4, 78-5, and 78-6 tested the K showing (Fig. 19). In 1979 the K showing was further explored by an additional 24 drill holes, totalling 7 928 metres. This work resulted in the discovery of a major stratiform barite-zinc-lead-silver deposit. To date drill indicated reserves of 18 million tonnes containing 2.3 per cent lead, 7.9 per cent zinc, and 49 grams per tonne silver with an additional down-dip geological reserve of approximately 15 million tonnes of similar grade have been announced. Extension of the deposit along strike is, as yet, untested.

STRUCTURAL AND STRATIGRAPHIC SETTING

The Cirque deposit is contained within a thrust panel of Devonian 'black clastics' which has been segmented by a series of southwest-dipping imbricate thrust faults (Fig. 20). The Devonian rocks define the northeast limb of an overturned synclinal structure which has been overridden and preserved beneath thrust plates of Silurian siltstone (unit S). Unit S is up to 400 metres thick in the vicinity of the Cirque deposit. Thrusting has been directed along incompetent black shale horizons of Late Ordovician to Early Silurian age (unit OS) which underlie the more competent limestone, chert, and shale unit (unit S_{ls}) at the base of the Silurian section.

The basal part of the Devonian succession is characterized by laminated silty shale with thin, poorly sorted siltstone, sandstone, conglomerate, and limestone interbeds (unit D_{ss}). These rocks, which are tentatively correlated with the Besa River Formation, are interpreted to be distal turbidites derived from a carbonate platform to the east. On the Cirque property, this unit is less than 50 metres thick and is overlain by more than 100 metres of siliceous argillite, chert, and carbonaceous black shale of the Gunsteel Formation (unit D_{sh}). A major facies change occurs on the eastern fringe of the property where unit D_{ss} passes abruptly into massive bedded limestone of the platformal Dunedin Formation (unit D_{ls}). This unit contains Middle Devonian fossil assemblages (Taylor and MacKenzie, 1970).

GUNSTEEL STRATIGRAPHY

The Cirque deposit occurs within an anomalously thick section of the Gunsteel Formation (Roberts, 1977). It is not certain whether this thickening represents a tectonic or primary depositional feature.

Four major subdivisions of the Gunsteel Formation (unit D_{sh}) are recognized, both on surface (Fig. 21) and in diamond-drill intersections (Fig. 22). These divisions are in ascending stratigraphic order:

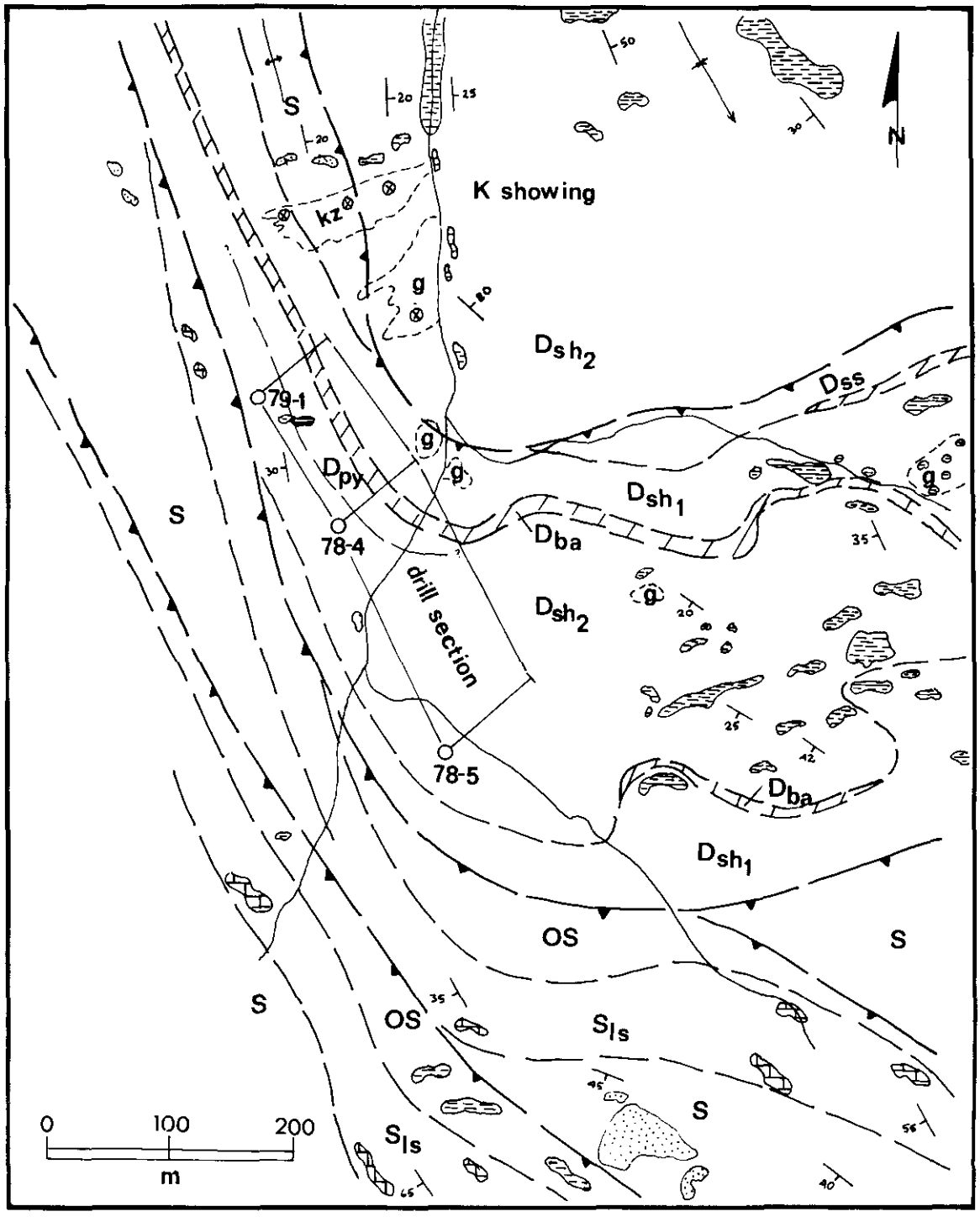

Figure 21. Detailed geology in the vicinity of the K showing as modified from company plans (*see* Figure 20 for location of map-area and Figure 22 for legend). Lithologic units are described in text. [g = gossan, Kz = kill zone, x - barite, Pb, Zn float.]

(1) Banded siliceous argillite and shale (map unit D_{sh_1});
(2) Baritic horizon (map unit D_{ba});
(3) Pyritic horizon (map unit D_{py}); and
(4) Argillite and shale (map unit D_{sh_2}).

UNIT D_{sh_1}

Unit D_{sh_1} forms the footwall of the Cirque deposit and is comprised of banded bluish grey-weathering siliceous argillite or chert with carbonaceous black shale interbeds. This division varies from 20 to 50 metres thick and is relatively resistant and competent. Roberts (personal communication) reports the occurrence of the ammonoid *Ponticeres* at the top of this unit indicating a lower Late Devonian age.

UNIT D_{ba}

Unit D_{ba} which conformably overlies unit D_{sh_1} is present on a regional scale and is characterized by black siliceous argillite or shale with nodular or blebby barite interbeds. This division, which is normally less than 5 metres thick, apparently grades into the much thicker massive barite horizon of the main mineralized zone.

UNIT D_{py}

Unit D_{py} varies from 20 to 30 metres thick and forms the hangingwall of the Cirque deposit. This unit is comprised of silvery grey to black-weathering, moderately siliceous argillite or shale with several 2 to 3-metre-thick zones of laminated, very fine-grained, or massive coarse-grained pyrite. Thin beds of nodular barite are also present. The overall sulphide content of this unit apparently decreases away from the massive barite horizon.

UNIT D_{sh_2}

Unit D_{py} apparently grades both up section and laterally into unit D_{sh_2} which is characterized by weakly to moderately siliceous carbonaceous black shale and argillite. To the east of the K showing this unit appears to be in excess of 200 metres thick.

MINERALIZATION

The K showing, located 2 kilometres southeast of the R float showing, is currently the main exploration target on the Cirque property (Fig. 20). The showing consists of several small outcrops and a prominent white-weathering barite kill zone exposed on the northeast-facing slope of a northwest-trending ridge. Diamond drilling in this area has intersected a massive coarsely crystalline (recrystallized ?) barite horizon containing diffuse bands and interstitial blebs of sphalerite and galena. This horizon varies from less than 5 to greater than 35 metres thick, appears to have a roughly lensoid or dish-like shape, and dips moderately to steeply to the southwest. Thin shaly partings and very fine-grained pyrite laminae occur locally within the massive barite. Average grades of drill intersections from this horizon are in the range of 9 to 15 per cent combined lead-zinc with 50 to 70 grams per tonne silver. The zinc/zinc + lead ratio of the 1978 drill

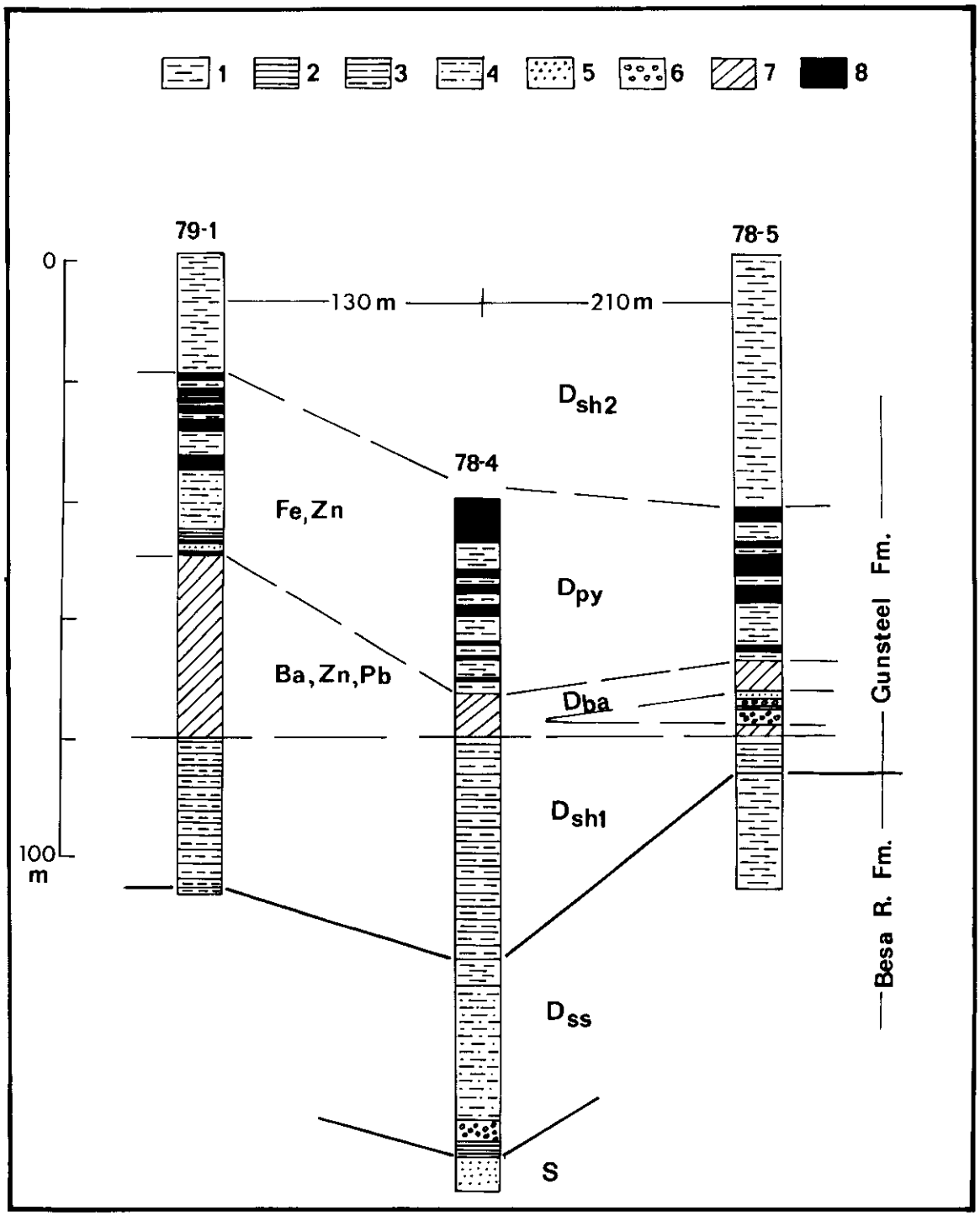

Figure 22. Composite drill section, Cirque claims (*see* Figure 21 for location of drill holes). [1 = weakly to moderately siliceous shale and argillite, 2 = siliceous argillite, chert, 3 = interbedded siliceous argillite, chert, and shale, 4 = silty shale, 5 = siltstone, 6 = conglomerate, 7 = massive barite, 8 = laminated pyrite in shale.]

intersections varied from 0.72 to 0.77. The overall ratio for the reserves defined in the 1979 program is 0.77.

Very fine-grained sphalerite and trace amounts of galena also occur in bands of laminated fine-grained and massive coarse-grained pyrite directly overlying the main barite horizon (unit D_{py}). Assay results from this zone are extremely variable and range from 0.5 to 8 per cent combined lead-zinc. Anomalously high background concentrations of lead and zinc also occur in rocks immediately underlying (unit D_{sh_1}) and overlying (unit D_{sh_2}) the main deposit.

Five selected samples from the Cirque property were analysed by the British Columbia Ministry of Energy, Mines and Petroleum Resources' laboratory. The results are listed as follows:

Sample No.	Ag	Ba	Cu	Pb	Zn
	ppm	*per cent*	*ppm*	*per cent*	*ppm*
Cirque 1	<10	57.03	15	1.7	13
Cirque 2	17	51.34	6	10.4	581
Cirque 3	<10	56.52	5	2.6	133
Cirque 4	18	0.03	155	0.33	1 850
79–CQ–51	*<10*	*19.60*	*45*	*0.013*	*40*

SAMPLE DESCRIPTIONS

Cirque 1-3 – massive coarsely crystalline white barite with blebs of galena; samples from barite kill zone, K showing.
Cirque 4 – laminated pyrite in siliceous black shale; float in creek, southeast of K showing.
79–CQ–51 – nodular barite in carbonaceous black shale; outcrop on ridge, 700 metres east-southeast of K showing.

The low concentrations of zinc in samples from the barite kill zone relative to those intersected in drilling suggests either selective leaching of zinc during weathering of the mineralized float or a possible facies change within the barite horizon going toward the east.

DISCUSSION

Roberts (1977) has suggested that the Cirque deposit formed within a fault-bounded sub-basin or trough which had restricted seawater circulation. This hypothesis is based on the reasonable assumption that the anomalous thickening of the Gunsteel Formtion is a primary depositional feature. Interbeds of coarse, poorly sorted conglomerate or breccia within the southern part of the massive barite horizon suggests the inferred bounding faults were tectonical active during the main pulse of mineralization. The thickness and lensoidal shape of the massive barite horizon and general lack of pelitic interbeds in consistent with Sato's (1972) model of accumulation of dense metalliferous brines in a seafloor depression and subsequent rapid crystallization. The reported occurrence of ammonites within the barite (Roberts, personal communication) further supports a syngenetic origin for the deposit. A period of alternating pelitic sedimentation and syngenetic to early diagenetic crystallization of pyrite followed the main episode of barite precipitation and was apparently restricted to the same basin of deposition. It is suggested that the source fluids for both types of mineralization emanated from rift zones bounding this basin.

ACKNOWLEDGMENTS

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