820263

# The Cirque Barite-Pb-Zn-Ag Deposits, Northeastern British Columbia

Lee C. Pigage, Cyprus Anvil Mining Corporation
600 - 1281 West Georgia Street,
Vancouver, B.C.

Detailed drilling and geology on the Cirque claims in northeastern British Columbia have outlined a stratiform, lensoid, barite-sulphides body 1000 metres long, 300 metres wide, and 2 to 60 metres thick. At present this deposit is the most significant of several stratiform barite-lead-zinc-silver deposits recently discovered in Devonian carbonaceous shales in the Akie District. Published drill indicated reserves for the Cirque deposit are 40 million tonnes with an average grade of 7.8% Zn, 2.2% Pb, and 47 grams/tonne Ag. Widely spaced drilling about 1 kilometre southeast of the Cirque has resulted in the discovery of the South Cirque deposit at the same stratigraphic horizon.

Both deposits consist of barite, pyrite, sphalerite and galena in decreasing order of abundance. Baritic, pyritic, and laminar-banded pyrite facies have been recognized although proportions of barite and sulphides range continuously from nearly pure barite to nearly pure sulphides. The main barite-sulphides bodies consist dominantly of baritic and pyritic facies with only minor shales and siltstone interbeds. Both of these facies are massive to diffusively banded on a scale of centimetres to metres. Laminar-banded pyrite is a marginal facies which contains numerous fine black siliceous shale interbeds and is Pb-Zn poor.

The Cirque deposit is an asymmetric, northerly trending, wedge-shaped lens. The axis of thickest barite and sulphides is near the western margin of the deposit; the highest Zn-Pb ratios also occur along this margin. Pyritic facies predominates in the northern part of the lens; baritic facies forms an envelope around the pyritic facies and increases in amount to the south along the general trend of the thickness axis. Laminar-banded pyrite occurs dominantly along the eastern margin and top of the deposit.

All facies exhibit depositional-diagenetic textures overprinted by deformation textures. Since pyrite is the main sulphide phase present, pyrite textures dominate the pyritic facies. In the massive ores, pyrite typically occurs as colloform aggregates with sphalerite and galena interlaminae. Barite and minor quartz and carbonate are interstitial. Concentric growth zoning patterns are common. In the laminated ores pyrite forms spheroidal framboidal clusters. Barite, galena and sphalerite occur as subhedral interstitial grains.

A pervasive deformation-cleavage has overprinted these primary textures. Massive pyrite aggregates are fragmented with fractures being infilled by remobilized galena. A spaced pressure solution striping is evident in areas dominated by framboidal pyrite. Barite and sphalerite are typically extensively recrystallized with partial to complete destruction of primary textures.

The deposits occur within earliest Late Devonian (Frasnian) carbonacecus shales of the Earn Group. The background depositional unit is a soft grey aluminous shale. Enveloping the deposits are diagenetically silicified, carbonaceous, thick-bedded shales and ribbon porcellanites. Contacts between sulphide bodies and enclosing fine clastic units are sharp. Stockworks, alteration halos, or disturbed bedding zones have not been found within the vicinity of the deposits. Chert-pebble conglomerates have not been noted in the immediate vicinity of the deposits; nearby they are stratigraphically above the mineralized horizon.

Akie District barite and barite-sulphides bodies were deposited within the Kechika Trough, a southeast extension of the Selwyn Basin. Cirque deposits occur within a northwest-trending, second order depositional trough which is bounded on the northeast margin by Early to Middle Devonian reefs. This second order trough is greater than 50 kilometres long and 8 kilometres wide. The deposits appear to be related to isolated basins or sub-basins within the second order trough. Little direct evidence of origin for the Cirque deposits is available, but their over-all features are consistent with other deposits considered to have formed by submarine venting of hydrothermal solutions or diagenetic replacement just after deposition of the host rocks. Following this sedex model has led to the discovery of several other barite-zinc-lead showings in the Akie District.

References:

Carne, R.C. and Cathro, R.J., 1982: Sedimentary exhalative (sedex) zinc-lead-silver deposits, northern Canadian Cordillera; CIM Bulletin 75, no. 840, 66-78.

Gabrielse, H., 1981: Stratigraphy and structure of Road River and associated strata in Ware (west half) map area, northern Rocky Mountains, British Columbia; Geological Survey Canada Paper 81-1A, 201-207.

Gordey, S.P., Abbott, J.G. and Orchard, M.J., 1982: Devono-Mississippian (Earn Group) and younger strata in east-central Yukon; Geological Survey of Canada Paper 82-1B, 93-100.

Jefferson, C.W., Kilby, D.B., Pigage, L.C., and Roberts W.J., 1983: The Cirque barite-zinc-lead deposits, northeastern British Columbia; in Sangster, D.F. (ed), Short course in sediment-hosted stratiform lead-zinc deposits. Mineralogical Association of Canada, 121-140.

MacIntyre, D.G., 1983: Geology and stratiform barite-sulphide deposits of the Gataga district, northeastern British Columbia; in Sangster, D.F. (ed), Short course in sediment-hosted stratiform lead-zinc deposits. Mineralogical Associate of Canada, 283-309.

Pigage, L.C., 1985: Geology of the Cirque barite-zinc-lead-silver deposits; northeasterr British Columbia, Canada; in Morin, J. (ed), Mineral Deposits of Northern Cordillera; CIM Special Volume, in press.

# GEOLOGY AND SULFIDE DEPOSITS OF ANVIL RANGE, YUKON TERRITORY

G.A. Jilson
Cyprus Anvil Mining Corporation
600-1281 West Georgia Street
Vancouver, B.C.
V6E 3K3

Anvil district is underlain by 5 km of polydeformed, late Precambrian to upper Paleozoic, metasedimentary and metavolcanic rocks intruded by a Cretaceous granitic plutonic suite. The stratigraphy of this metamorphic complex is divided into an upper and lower division. Rocks of the lower division are most certainly North American and have strong affinities with well-known Selwyn Basin stratigraphy representing the most southwestern (basinward) present-day examples. Rocks of the upper division are more suspect and may be partially allochthonous. The southwestern margin of the district is truncated by two major Mesozoic faults separating it from the adjoining Yukon-Tanana terrane.

The lower stratigraphic division is made up of three regionally mappable units of late Precambrian to Silurian age. Monotonous, non-calcareous pelites at least 5 km thick of Mt. Mye Formation form the basal stratigraphic unit in the district. Mt. Mye strata are correlated with unnamed, lithologically similar assemblages beneath Rabbitkettle Formation toward Mackenzie Platform northeast of the district. Calcareous phyllites and lesser basaltic extrusive and intrusive rocks of Vangorda Formation overlie the Mt. Mye with narrowly gradational contact. The 1 km thick Vangorda sequence is correlated with the more calcareous Rabbitkettle Formation toward Mackenzie Platform. A 1 km thick basaltic metavolcanic sequence named Menzie Creek Volcanic Unit overlies and is interleaved with the upper Vangorda Formation. Carbonaceous phyllites, slates and siltstones containing lower Ordovician to lower Silurian graptolite fauna are interbanded with the diverse Menzie Creek volcanic facies. These metasediments are lithologically and faunally similar to strata of Road River Group with which the Menzie Creek is correlated. The lower stratigraphic division of Anvil district represents a deep marine sedimentary prism which accumulated on a trailing continental margin subjected to frequent episodes of extensional tectonism resulting in the emplacement of the basaltic component of the section.

The upper stratigraphic division along the northeastern margin of the district is autochthonous, lithologcally similar to and homotaxial with Earn Group in adjacent Glenyon map area. Relationships of the upper and lower divisions along the district's southwestern margin is less certain. The thick (1 km) sequence of varicoloured, phyllitic cherts capped by massive alkaline basalts is in part similar to Earn Group, but the upper portion of this chert package and overlying basalts comprise the type section of Anvil Range Group. While a distinct structural discontinuity between these sequences is not locally recognized, regional relationships outside the district suggest Anvil Range Group, at least, formed in an oceanic basin outboard of North America and is allochthonous.

Anvil district has a complex polydeformational/polymetamorphic history. Two overlapping Mesozoic regional metamorphic and folding events are recognized in low pressure, Buchan-type facies series ranging from greenschist to amphibolite facies grades. These metamorphic zones decrease in grade radially outward and stratigraphically upward from a central metamorphic/plutonic culmination termed Anvil Arch which domes the entire stratigraphic sequence into an open, doubly-plunging antiform. Subsequent events are regionally nonpenetrative, brittle folding and faulting episodes superimposed on earlier fabrics.

Five stratiform, pyritic lead-zinc-silver-(barite) deposits associated with anomalous thickness of graphitic phyllite are developed in a 150 m thick interval straddling the contact of Mt. Mye

and Vangorda Formations. The bulk of this mineralization occurs in uppermost Mt. Mye Formation, but the highest horizons in multi-layered deposits are hosted by basal Vangorda Formation. A pre-mining geological reserve of 120,000,000 tonnes of 3.7 percent lead, 5.6 percent zinc and approximately 45 to 50 gm/tonne silver applies to the aggregated five deposits.

An arrangement of sulfide lithofacies is commonly seen in deposits of the district. Graphitic to non-carbonaceous, disseminated sulfide-bearing quartzites form the basal and/or marginal facies of a deposit which are succeeded upwardly and inwardly by massive pyritic sulfides, then baritic massive pyritic sulfides. This consistently recurring facies arrangement may occur on the scale of an entire deposit cross-section to a 1 m length of drillcore. This idealized arrangement is commonly interrupted, truncated or imperfectly developed. Sulfide facies cyclicity may result from repetitively occurring physiochemical factors at the site of sulfide deposition or reservoir of brine evolution.

Sulfide deposits have a variably developed, white mica-dominant alteration envelope commonly best developed in a deposit footwall. This alteration may represent hot ore fluid/wallrock interaction along the ore fluid pathway; a metamorphic reaction envelope between the sulfides and enclosing sediments or a combination of these origins. Demonstrable feeder zones for Anvil deposits are absent.

In plan, the known sulfide deposits of Anvil district describe a northwest-southeast trending curvilinear array. Graphitic phyllites associated with the Mt. Mye/Vangorda contact thicken abnormally southwest of this deposit line. Additionally, the first major pulse of basaltic volcanism in the Anvil pile is recognized along this contact. These features taken together are consistent with a genetic model involving extensional tectonism, rifting and passive basaltic volcanism with focused exhalation of evolved, metalliferous, basinal brines along synsdimentary growth faults into local, reduced basins.

**References**

Jennings, D.S., and Jilson, G.A., 1985, Geology and sulfide deposits of Anvil Range, Yukon Terrirtory: Canadian Institute Min. Inst. Min. Metall. Bull., in press.

Tempelman-Kluit, D.J., 1972, Geology and origin of the Faro, Vangorda, and Swim concordant zinc-lead deposits, central Yukon Territory: Geol. Survey Canada Bull. 208, p. 73.