



Occurrence Details

Occurrence Number: 105G 118

Occurrence Name: Ice

Occurrence Type: Hard-rock

Status: Deposit

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General Information

Primary Commodities: copper

Secondary Commodities: cobalt, gold, silver

Deposit Type(s): Volcanogenic Massive Sulphide (VMS) Cyprus Cu-Zn

Location(s): 61°52'29" N - -131°21'37" W

NTS Mapsheet(s): 105G14

Location Comments: .5 Kilometres

Hand Samples Available: No

Last Reviewed:

Capsule

Work History

Staked as Ice cl 1-16 cl (YB74423) in Feb/96 by Expatriate Resources Ltd to cover a copper soil geochemical anomaly identified during a 1973 survey managed by Archer, Cathro & Associates Ltd. In May/96, a company geologist discovered secondary copper mineralization near the occurrence location, leading Expatriate to stake Ice cl 17-48 (YB844050). Between Jun/96 and Jun/97 the company staked an additional 1 057 Ice claims.

Work in 1996 consisted of geological mapping, prospecting, grid soil sampling, ground geophysical surveys and 34 diamond drill holes (2,704.35 m). All of the work was carried out in a 5 km area centred on the occurrence location. Following completion of the 1996 field program, Expatriate flew an airborne geophysical survey over the entire claim block.

In 1997 Expatriate carried out regional geological mapping, prospecting, and soil sampling programs over the entire property and continued detailed geological mapping, soil sampling and geophysical programs around the occurrence area. The company drilled 87 diamond drill holes (7,879.7 m), of which all but 5, tested the known deposit (occurrence).

In 1998 Expatriate carried out reclamation work on the claims.

Expatriate Resource's 2003 assessment report (094385) lists a revised sectional resource (not NI43-101 compliant).

In Dec/2004 Expatriate reorganized and transferred most of its exploration projects outside the Finlayson district to its subsidiary Pacifica Resources Ltd and then changed its name to Yukon Zinc Corporation.

Capsule Geology

The occurrence is located west of the Pelly River and north of the Robert Campbell Highway, in an area of subdued topography with limited outcrop. The area is underlain by pillowed, massive and fragmented mafic volcanic rocks interlayered with chert, argillite and rarely limestone. These rocks were previously thought to belong to the Slide Mountain terrane but geological mapping (Murphy et al., 2001) assigns the rocks to Early Permian Campbell Range Succession, thus making them part of the Yukon-Tanana terrane. The Campbell Range Succession is thought to represent the culmination of the transition from arc-rifting or back-arc extension to oceanic or back-arc marginal magmatism and sedimentation. The Yukon-Tanana terrane hosts numerous volcanic-hosted massive sulphide (VMS) deposits, including the Fyre Lake deposit (Minfile Occurrence 105G 034) in the Upper Devonian Fire Lake mafic metavolcanic unit, the Kudz Ze Kayah deposit (Minfile Occurrence 105G 117) in the Upper Devonian Kudz Ze Kayah felsic metavolcanic unit, and the Wolverine deposit (Minfile Occurrence 105G 072) within the lower Mississippian Wolverine Succession. The Ice occurrence (deposit) was the first VMS deposit identified in the Campbell Range Succession and its discovery led to a staking rush and a re-evaluation of the succession's economic potential.

Based on outcrop and drill hole data, the occurrence area is underlain by relatively unstrained, massive basalts and locally important pillowed and fragmented varieties of the Campbell Succession (unit PCb). Chert, argillite and rarely limestone are intercalated with basalt. Maroon, pink and green chert, and siliceous phyllite are locally important to define a separate unit, (unit PCc). Earlier maps by Murphy and others broke the basalt into 2 units, but the most recent map lists them as one unit (Murphy et al., 2001). Elsewhere in the area Murphy noted serpentinized ultramafic intrusions (unit Pum) intruding the sequence.

Previous mapping has interpreted the contacts between serpentinized ultramafic rocks and basalt as thrust faults, however recent mapping indicates the ultramafic rocks may be sills. The base of the Campbell Range succession is inferred to be a profound regional unconformity, developed after movement on the Jules Creek thrust. The succession overlies both the Finlayson succession in the footwall of the Jules Creek thrust and rocks in the hanging wall. The Campbell Range succession must therefore overlap the Jules Creek thrust, and thrusting must therefore be late Pennsylvanian in age. Along the southwest border of the Ice claim block, Expatriate noted muscovite-chlorite-quartz schists which Murphy assigned to unit CMCu, undifferentiated layered rocks of Carboniferous age.

The dominant structure in the eastern half of the property is a broad syncline, the nose of which is in the vicinity of the Ice deposit. The western half of the property is underlain by a homoclinal sequence dipping to the northeast. Two main fault sets are recognized, one trending north-northeast and the other northwest. The faults are limited to widely spaced, steeply dipping strike slip structures with minimal offset.

Prospecting in 1996 located a 30 m diameter vegetation kill zone consisting of malachite cemented glacial till. Typical specimens from the kill zone assayed 0.68% Cu while malachite-rich specimens assayed up to 11.3% Cu. The samples returned near background values for other metals. Subsequent prospecting located mineralized basalt outcrops and float north and west of the kill zone. Rock samples contain abundant malachite and rare azurite on internal fractures but little or no copper mineralization on external surfaces. Except for the fracture mineralization, the rocks in the area are barren. A second kill zone was identified 250 m north of the discovery (occurrence) showing. Samples from this area returned lower Cu values but higher precious metal values (up to 7.6 g/t Ag and 1.28 g/t Au).

Grid soil sampling outlined a 1,400 m by 500 m wide area, centred over the discovery showing, which returned strongly anomalous Cu (>10,000 ppm) and anomalous Zn (1,450 ppm max.) and Co (200 ppm max.) values. Three secondary copper anomalies were outlined on the edges of the grid. Geochemical response for other metals is generally subdued and shows little direct correlation with the main indicator minerals or areas of surface mineralization. Ground geophysical surveys conducted over the grid outlined 2 weak to moderate conductors, the strongest of which is centred over the occurrence. The other conductor parallels the first about 250 m to the east. The airborne geophysical survey outlined many "anomalies on the claim block which are typical of massive sulphide response". The airborne survey detected the conductors outlined by the ground geophysical surveys.

Diamond drilling in the occurrence area outlined the presence of both primary and secondary mineralization. Primary Cu-Au-Co mineralization occurs in two main sulphide horizons, an upper massive sulphide horizon and a lower stockwork sulphide horizon which contains lenses of semi-massive to massive sulphide. Both are hosted within the basalt unit, which Expatriate subdivided into four members: a lower massive basalt, a brecciated basalt, a porphyritic basalt and an upper massive basalt. The strata between the two sulphide horizons are generally unmineralized, locally however, feeder zones immediately underline the upper sulphide horizon.

The upper sulphide horizon occurs at the contact between porphyritic basalt and the overlying massive basalt. Locally the porphyritic basalt is absent and the massive sulphide mineralization lies on the brecciated basalt. The mineralized horizon commonly lies within an envelope of bright red to maroon, locally hematized basalt that is interbedded with reddish jasperoidal silica, up to 0.5 m thick. Mineralization consists primarily of medium-grained pyrite aggregates disseminated in a gangue of milky white quartz. Chalcopyrite and locally bornite form interstitial grains associated with quartz. The pyritic sulphides frequently display breccia textures.

The lower stockwork sulphide horizon occurs about 35 m below the upper massive sulphide horizon. Locally it contains massive sulphide layers up to 10 m thick although generally the mineralization consists of quartz-sulphide stringers and replacement zones within brecciated basalt. Specular hematite-quartz-pyrite forms the matrix to the brecciated basalt; the matrix and fragments are cut by quartz-pyrite veins and stringers. These early veins and stringers are cut by quartz-pyrite-chalcopyrite veins.

Surface oxidation coupled with leaching and ground water transport have produced in situ and remobilized secondary copper mineralization along the surface trace of the sulphide zone and downhill from it. Secondary mineralization typically ranges between 5 and 50 m below surface, and extends to almost 80 m along fractures. This includes minerals which have wholly or partially replaced primary sulphide minerals and others which were precipitated from ground water. Secondary copper minerals consist predominantly of cuprite, malachite, black copper oxides and chalcocite.

The best drill results were obtained near the centre of the drill area (occurrence location), within a 350 m long approximately 50 m wide zone comprising thick massive sulphide accumulations. Copper intersections within this zone include 5.20% over 20.56 m, 8.56% over 5.92 m, 3.57% over 28.55 m, and 4.09% over 7.55 m. The high grade core of massive sulphides is surrounded by a broad halo containing thick sections of lower grade mineralization. Copper grades in the halo typically range from 1.5% to 3% in the massive to semi-massive sulphide horizon, 0.5% to 1.2% in sulphide stockwork zones and 0.2 to 1.5 % in secondary copper mineralization. Multi-element analyses indicates that no significant detrimental elements are present in the mineralization.

The discovery of massive sulphides in mafic volcanic rocks of the Campbell Range Succession represents a new style of volcanic hosted massive sulphide mineralization in the Yukon-Tanana terrane. Based on its metal signature and relationship to enclosing basaltic wallrocks the Ice deposit is categorized as a Cyprus-type volcanogenic massive sulphide. This type of mineralization forms along fissure zones in active spreading centres and is found where ocean floor has been obducted. The classic type deposits are in the eastern Mediterranean while some of the best Canadian examples are located in Newfoundland.

Mineralization in Cyprus-type deposits can be confined to a single lens but often occurs as a string of lenses along an elongate fissure zone. Volcanism within spreading centres is usually intermittent and fissures are often reactivated producing mineralized horizons at several stratigraphic levels. Tectonic activity coupled with volcanism typically result in rapid facies changes.

The Ice deposit contains an indicated mineral resource of 4,561,863 tonnes grading 1.48% Cu with minor gold, silver and cobalt. Included within this resource is a near surface open pitable resource of 3.4 million tonnes at 1.48% copper of which 2.7 million tonnes is oxide (Expatriate Resurces 2002 Annual Report). The total indicated resource is overlain by a significant amount of additional, near surface oxide copper mineralization for which there is insufficient data to estimate a resource. Although the deposit is largely closed off by existing drilling, the Ice claim block is large and most of the surrounding favourable stratigraphy remains untested.

Expatriate Resource's 2003 assessment report (094385) recalculated an undiluted resource of 1 MT grading 4.32% of sulphide material for a strike length of 450m (not 43-101 compliant).

Work History

Date	Work Type	Comment
7/2/2003	Studies	Moore et al, June 2003.
12/31/1998	Development, Surface	Company removed debris from exploration camp, carried out general clean-up.
12/31/1997	Drilling	Eighty-seven holes, 7,879.7 m.
12/31/1997	Geology	
12/31/1997	Geochemistry	
12/31/1997	Other	
12/31/1996	Drilling	Thirty-four holes, 2,704.35 m.
12/31/1996	Geology	
12/31/1996	Geochemistry	
12/31/1996	Airborne Geophysics	Also resistivity, VLF and magnetic surveys. Company flew airborne geophysical survey over entire property after finishing initial drill program.
12/31/1996	Other	
12/13/1996	Ground Geophysics	Total magnetics and HLEM surveys.
12/13/1973	Geochemistry	

Assessment Reports that overlap occurrence

Report Number	Year	Title	Worktypes	Holes Drilled	Meters Drilled
094301	2002	2002 Geophysical Report for the Ice and Assist Claims in the Watson Lake Mining District, Yukon Territory, Canada	Process/Interpret - Pre-existing Data		
094018	1998	Assessment Report Describing Reclamation Work on the Ice Property	Reclamation - Development, Surface		

