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THE LOCHINVAR VOLCANOGENIC MASSIVE-SULPHIDE DEPOSIT, CATCHERS POND GROUP, CENTRAL NEWFOUNDLAND[1]

T. Froude, D.T.W. Evans[2], D. Mullen[3] and D.H.C. Wilton[4]
Archean Resources Limited, Suite 740, Cabot Place, St. John's, Newfoundland, A1C 6K3

ABSTRACT

The Lochinvar volcanogenic massive-sulphide deposit is located within calc-alkaline volcanic rocks of the Ordovician Catchers Pond Group. The deposit occurs within a sequence of strongly deformed, sericitized and carbonatized felsic pyroclastic rocks up to 75 m thick. Sulphide mineralization comprises several zones or lenses of heavily disseminated to massive sphalerite, galena, chalcopyrite and pyrite, containing significant concentrations of tennantite, electrum and barite. Preliminary calculations indicate a geological resource of 588 000 tonnes grading 3.9 percent Zn, 1.4 percent Pb, 0.4 percent Cu, 60.0 g/t Ag and 0.45 g/t Au.

INTRODUCTION

The Lochinvar massive-sulphide deposit is located about 4 km southwest of the community of King's Point, Green Bay, Newfoundland (Figure 1). The deposit occurs on property that also hosts the nearby Hammerdown and Rumbullion gold deposits and the recently discovered Batters Brook massive sulphide zone; all are owned by Major General Resources Limited. The former Rendell–Jackman copper mine is approximately 3 km to the northeast. Access to the property is gained via logging roads and trails west of Route 391, the King's Point Highway. The deposit was discovered by Noranda Exploration in 1990, but was not thoroughly explored until 1994 when Major General Resources took control of the property. A total of 18 diamond-drill holes has defined a zone of mineralization with a strike length of 100 m to a depth of 200 m (Figures 2 and 3). Preliminary geological reserves stand at 588 000 tonnes grading 3.9 percent Zn, 1.4 percent Pb, 0.4 percent Cu, 60 g/t Ag and 0.45 g/t Au.

REGIONAL GEOLOGY

The deposit lies within the Ordovician Catchers Pond Group that forms part of the Dunnage Zone of the Central Mobile Belt of Newfoundland, as defined by Williams (1979). The Dunnage Zone records part of the history of Iapetus and consists of a variety of volcanic, plutonic and sedimentary rocks of Paleozoic age.

The Catchers Pond Group is in fault contact with adjacent rocks except to the north, where it may conformably overlie the Lushs Bight Group (Kean *et al.*, 1995). To the west, the group is in fault contact with intrusive rocks of the Kings Point Complex along the Green Bay Fault. To the east and southeast, the Catchers Pond Group is in fault contact with the Silurian Springdale Group. The southern and southwestern margins of the Catchers Pond Group are thought to be in fault contact with granitic rocks and in part, structurally overlain by volcanic rocks of the Sheffield Lake group (Coyle and Strong, 1986).

LOCAL GEOLOGY

The Catchers Pond Group has been described as being of calc-alkaline affinity, recording the transition from ocean-floor to an island-arc environment (Jenner and Szybinski, 1987). The group consists of pillowed mafic flows, fine-grained mafic tuffs, intermediate to felsic flows and fragmentals and minor chert, iron formation and limestone (Figure 1). Late felsic and mafic dykes and plugs intrude all the rock types.

Stratigraphy in the Lochinvar deposit area (Figure 3), from the structural footwall through to the hanging wall, consists of medium- to dark-green, feldspar porphyritic mafic volcaniclastic rocks characterized by scoriaceous lapilli. This unit is generally in fault contact with the overlying

[1] Buchans – Robert's Arm multidisciplinary project: geology and mineralization

[2] Mineral Deposits Section, Geological Survey. [3] Major General Resources Limited, 10th Floor, 900 West Hastings Street, Vancouver, British Columbia, V6C 1E5. [4] Department of Earth Sciences, Memorial University of Newfoundland, St. John's, Newfoundland, Canada, A1B 3X5

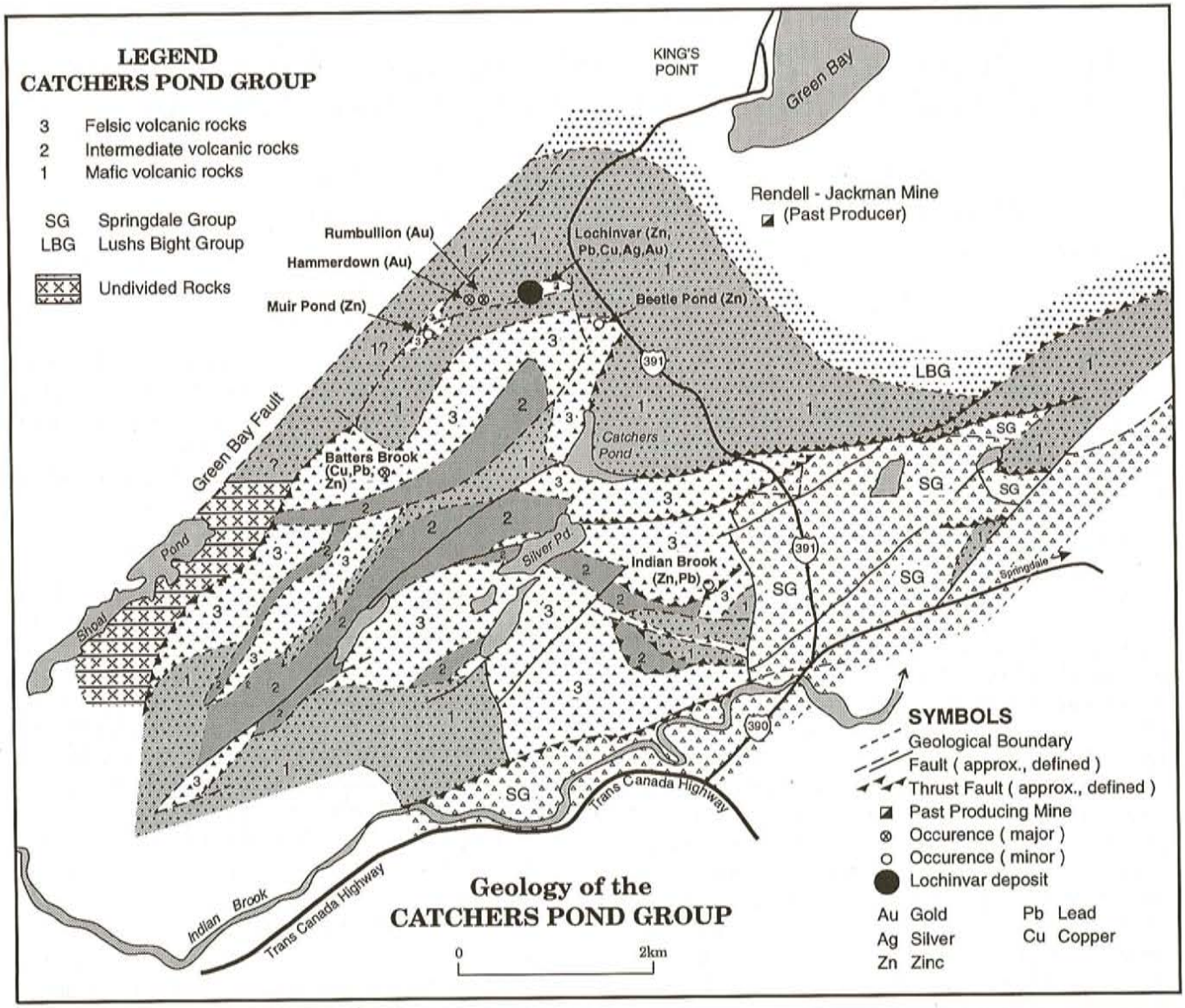

Figure 1. *Geological map of the Catchers Pond Group showing the locations of the mineral occurrences discussed in the text (modified from Jenner and Szybinski, 1987).*

mineralized felsic sequence, but itself is relatively undeformed. This fault is a significant local structure dubbed the "Captain Nemo Fault". It truncates the Lochinvar horizon as well as the nearby Hammerdown and Rumbullion gold deposits.

The mineralized felsic sequence is up to 75 m thick and includes grey to green, coarsely fragmental quartz porphyritic to finely bedded cherty ash tuffs, all strongly sericitized, carbonatized and locally chloritized. Much of the unit is strongly deformed and is preserverd as sericitic schist. Intruding the felsic sequence are a series of massive, locally porphyritic felsic sills (?) or dykes up to 10 m thick. Also intruding the felsic rocks is a wedge-shaped mafic sill characterized by abundant leucoxene, locally abundant feldspar and possible chloritoid.

The base of the hanging-wall sequence is a unit of green, aphyric andesite/dacite fragmentals up to 75 m thick that appears to conformably overlie the felsic package. Generally, this unit has a distinctive wispy, streaky texture highlighted by the coarsely fragmental character of the unit. This sequence is intruded by numerous thin, leucoxene-bearing mafic dykes.

The upper part of the hanging-wall stratigraphy consists of dark-green, fine-grained mafic flows (possibly locally pillowed) and tuffs, locally well bedded and graded, and

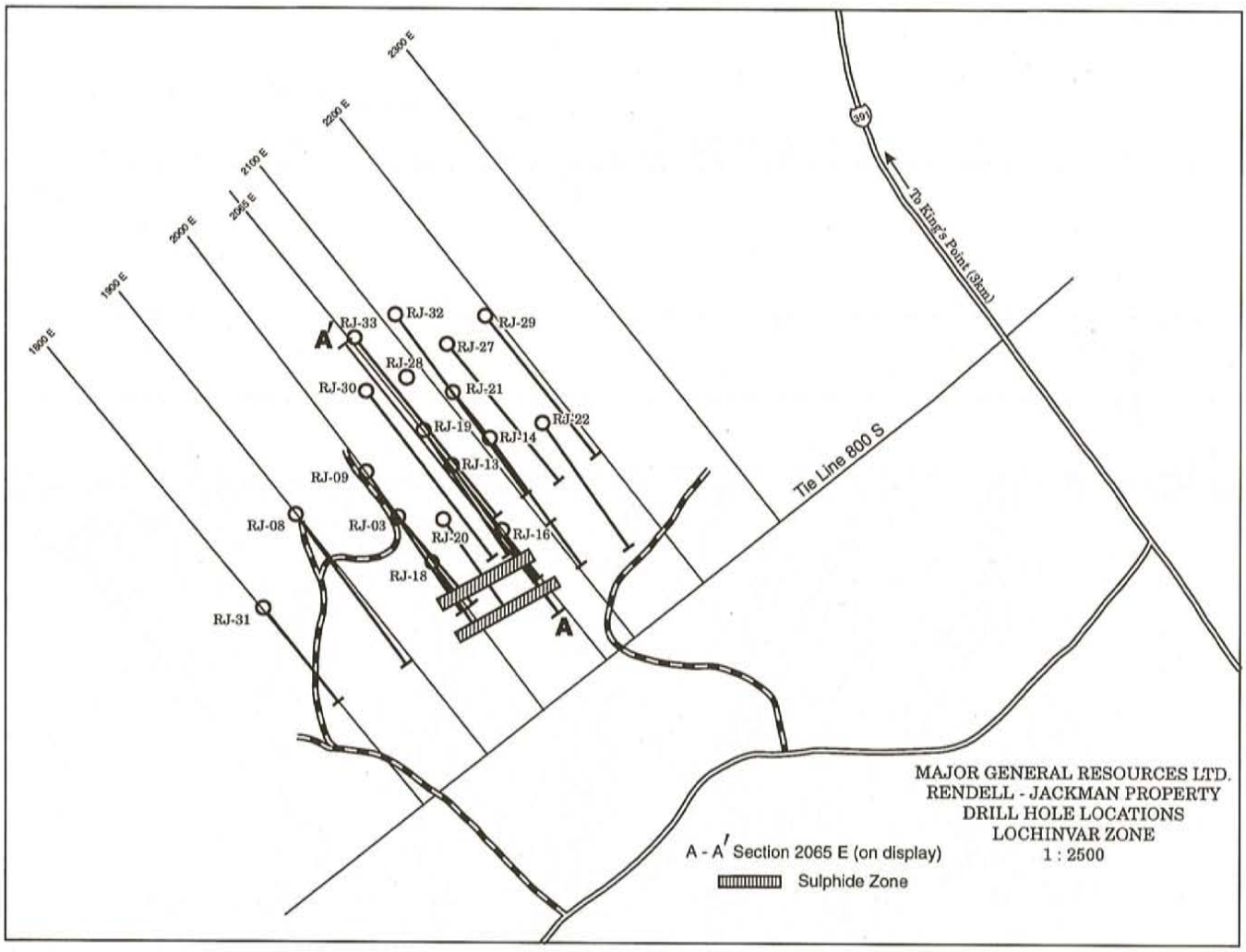

Figure 2. *Diamond-drill plan, Lochinvar zone.*

minor chert and iron formation. Tops obtained from the graded tuff beds indicate that tops are uphole, or to the northwest. The thickness of this unit has not been determined. These mafic rocks are typically moderately chloritic and weakly to moderately pervasively carbonatized (calcite). The chert/iron formation horizons are somewhat discontinuous and highly variable in thickness, from a few centimetres to several metres thick. This may be the result of tight isoclinal folding unrecognizable in the more massive mafic units. The hanging-wall mafic rocks are also host to a series of narrow, but continuous, quartz-sulphide veins. At least two of these veins are host to high-grade gold mineralization that is the focus of current exploration efforts.

ALTERATION

The felsic volcanic sequence, which hosts the Lochinvar base- and precious-metal mineralization, has been strongly altered by hydrothermal fluids, most likely related to deposition of the massive-sulphide deposit. The alteration is expressed as intense sericitization and carbonatization (iron carbonate). Chlorite is developed locally, mainly in the central portion of the mineralization. Chlorite associated with stockwork mineralization and related alteration is absent at Lochinvar, probably due to structural disruption. Whole-rock analysis carried out by Major General Resources indicates that the felsic volcanic rocks have been strongly depleted in sodium (as low as 0.2 percent Na_2O) and enriched in potassium and magnesium (up to 5.2 and 8.5 percent, respectively). The felsic package and associated mineralization have been strongly deformed creating numerous zones of fault gouge and probably reflect preferential absorption of stress by the relatively softer, altered rocks.

Sericite and carbonate (calcite ± iron carbonate) alteration is also present in the overlying andesite/dacite unit but to a much lesser degree than the felsic rocks.

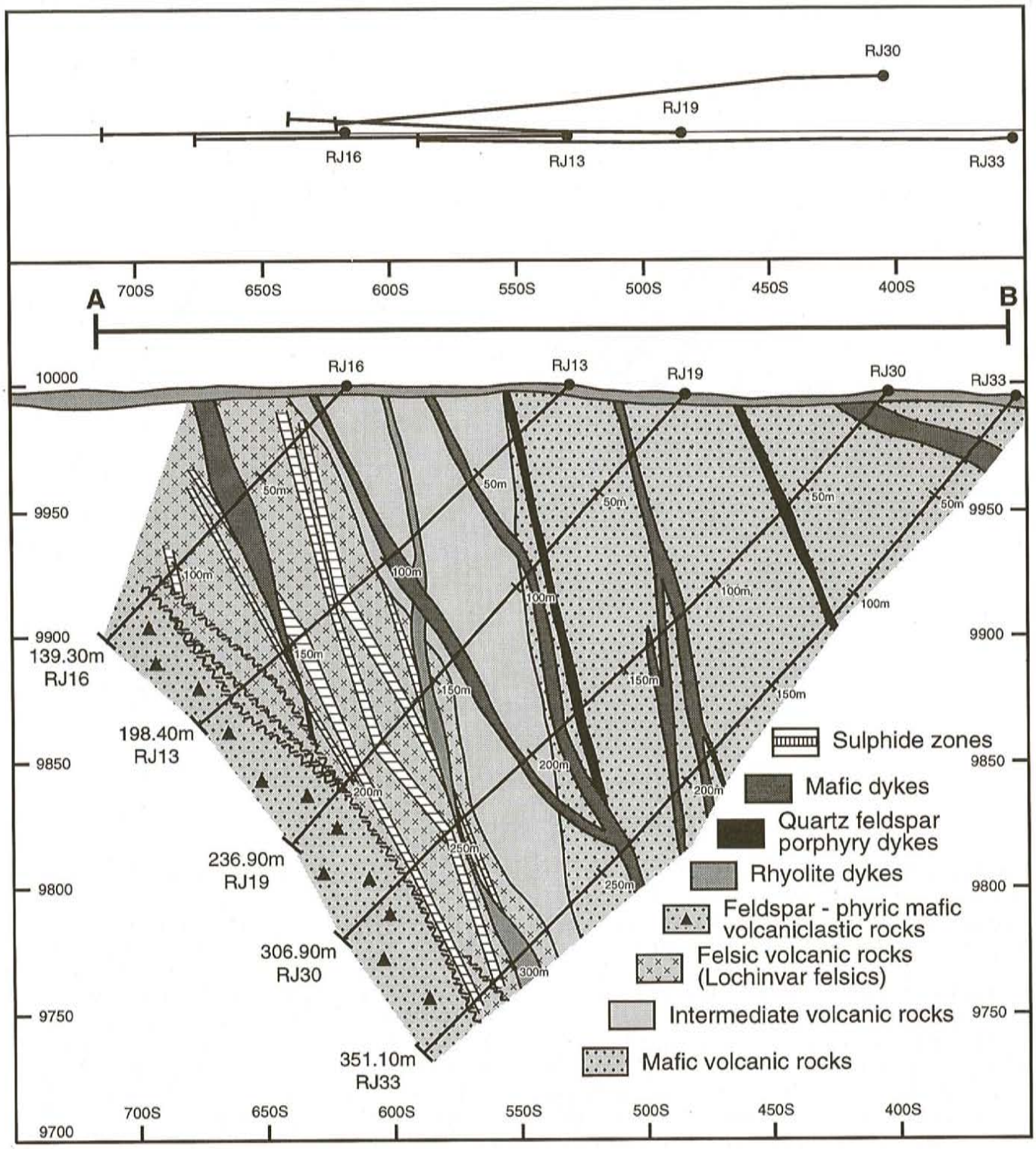

Figure 3. *Diamond-drill section (RJ16-RJ33), Lochinvar deposit. View is to the southwest.*

MINERALIZATION

The mineralization at Lochinvar has been defined by diamond drilling to have a strike length of 100 m and a depth of 200 m. The Lochinvar polymetallic massive-sulphide deposit consists of several zones of massive to heavily disseminated sphalerite, galena, chalcopyrite, pyrite, barite and significant amounts of tennantite and electrum. The

mineralization occurs as massive beds, irregular stringers and disseminations of sphalerite, galena, pyrite, chalcopyrite and barite. The sulphides occur as relatively fine-grained complex mixtures of mainly very light-coloured (iron poor) sphalerite with lesser galena and minor chalcopyrite. Barite occurs as thin discontinuous bands and also as fine disseminations and ragged stringers associated with the sulphides. The sulphides appear to be recrystallized and possibly locally remobilized into stringer sulphide zones. Locally, grades are impressive, 13.2 percent Zn, 7.0 percent Pb, 1.8 percent Cu, 298 g/t Ag and 2.13 g/t Au over 2.25 m from hole RJ-94-21. It is estimated that the deposit contains a geological resource of 588 000 tonnes grading 3.9 percent Zn, 1.4 percent Pb, 0.4 percent Cu, 60 g/t Ag and 0.45 g/t Au.

Absent at Lochinvar is the footwall or stockwork mineralization associated with most volcanogenic sulphide deposits. This is assumed to be a structural complication owing to the amount of faulting and shearing that has affected the area.

Associated with the more massive mineralization are zones of weak to moderate pyrite, generally poor in base metals, but highly enriched in silver, up to 227 g/t over 1.0 m from hole RJ-94-13 and averaging 125.0 g/t Ag over 4 m, occasionally with 1.0 to 3.0 g/t Au over 1.0 m. This enrichment in silver possibly indicates the presence of native silver (as at Buchans), or an as yet unidentified silver-bearing mineral such as tennantite.

SUMMARY

The Lochinvar massive-sulphide deposit occurs within island-arc volcanic rocks of the Ordovician Catchers Pond Group, 4 km southwest of King's Point, Newfoundland. The Catchers Pond Group has been described as being calc-alkaline and has been correlated with the Buchans and Roberts Arm groups. Massive sulphide mineralization at Lochinvar is zinc, lead and silver-rich along with significant gold and copper. Erratic concentrations of barite are associated with the sulphide mineralization. These characteristics suggest that Lochinvar may be similar to the Buchans high-grade, polymetallic deposits.

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