The Koorae Prospect: Geological Setting of Porphyry Style Copper Mineralization in the Topsails Intrusive Suite, West-Central Newfoundland

Dean Courage[1,*], Stephen J. Piercey[1], Dale O'Reilly[2], Irvine R. Annesley[3], and Lawrence Winter[2]
1 - Department of Earth Sciences, Memorial University of Newfoundland and Labrador, St. Johns, NL, Canada, A1B 3X5

2 - Altius Resources Inc., 66 Kenmount Road, Suite 202, St. Johns, NL, Canada, A1B 3N4

3 - JNR Resources Inc., 204 – 315 22nd St. East, Saskatoon, SK, Canada, S7K 0G6

*Corresponding author – d.courage@mun.ca

Summary
The Koorae Prospect represents a recently discovered intrusion- and volcanic-hosted copper-molybdenum-silver-gold occurrence within the Silurian-Devonian Topsails Intrusive Suite (TIS) of west-central Newfoundland. Detailed mapping and sampling of the prospect illustrates that the mineralization is hosted in a quartz-feldspar porphyry and a volcanic sequence of green lapilli tuff and a maroon, flow-banded rhyolite. An exposure of basement gneiss, presumably of the Hungry Mountain Complex (HMC), is visible in the trench as well as frequent crosscutting, diabase dikes. Chalcopyrite is the dominant copper sulfide mineral and is disseminated throughout the porphyry. Chalcopyrite, chalcocite and bornite are also found in the lapilli tuff and spherulitic rhyolite with local occurrences of veinlet and breccia-style mineralization. Alteration of the porphyry groundmass includes hematite, magnetite, K-feldspar, chlorite and epidote with various intensities of quartz alteration in the lapilli tuff and rhyolite. Ongoing research includes lithogeochemistry, petrography, and geochronology to understand the controls on mineralization and to develop a geological and exploration model for various commodities within the TIS.

Introduction
The Silurian (~429-427 Ma) Topsails Intrusive Suite and associated volcanic rocks in west-central Newfoundland have seen limited mineral exploration. In recent years, however, numerous Cu, U, F, and rare-earth element (REE) occurrences have been discovered within the intrusive suite during reconnaissance exploration programs conducted under an alliance between Altius Resources Inc. and JNR Resources Inc. The Koorae prospect, which was discovered in 2008, represents one of these new occurrences and consists of porphyry-type Cu-Mo-Ag-Au mineralization associated with felsic intrusive and subaerial volcanic rocks of the TIS.

Highlights from the Koorae prospect include grab samples from two locally derived altered tuffaceous boulders that returned assays of 3.5% Cu, 0.12% Mo, 35.1 g/t Ag, 0.18 g/t Au and 2.0% Cu, 0.16% Mo, 19.8 g/t Ag, 0.29 g/t Au. Of twenty-three grab samples collected from the quartz-feldspar porphyry, twenty-one returned anomalous values of up to 0.87% copper, with an average of 0.15% copper. Sampling of adjacent, strongly altered, felsic volcanic rocks returned a best in-situ result of 0.39% Cu, 0.04% Mo and 0.9 g/t Ag. The spherulitic rhyolite unit of the volcanic sequence returned a best assay of 0.67% Cu, 0.03% Mo and 7.4 g/t Ag (JNR Resources Inc., Press Release Nov. 30, 2009).

In this poster, we provide the first documentation of the geological setting and style of mineralization from the Koorae Cu-Mo-Ag-Au Prospect within the Topsails Intrusive Suite and associated rocks in west-central Newfoundland.

Regional Geological Setting

The Koorae prospect is hosted in the Silurian (~429-427 Ma) Topsails Intrusive Suite and associated subaerially emplaced volcanic rocks (Whalen et al., 1996; Whalen et al., 2006). The TIS represents peralkaline (A-type) granitoid magmatism that formed due to Silurian post-orogenic collapse and extension following Silurian orogenesis within the Dunnage Zone of west-central Newfoundland (Whalen and Currie, 1984; Whalen, 1989; Whalen et al., 1996; Whalen et al., 2006; van Staal, 2007). The TIS consists of several intrusive and volcanic sequences outcropping over approximately 2400 km^2 and are dominated by amphibole granites, syenites and quartz-feldspar porphyries (Whalen, 1989). These rocks intrude the Silurian Springdale Group, a slightly older, bimodal sequence of subaerial vesicular basalts and voluminous red flow-banded rhyolites and ash-flow tuffs (Whalen et al., 1996).

Geology, Mineralization and Alteration at the Koorae Prospect

Following the discovery of mineralized boulders and subcrop in 2008, the outcrop of the Koorae prospect was excavated in 2009 allowing for detailed mapping and sampling. An area of approximately 100 metres by 15 metres was exposed and exhibits mineralization hosted by a sequence of medium to coarse-grained quartz-feldspar porphyry which intrudes a volcanic sequence consisting of green tuff, polylithic and welded lapilli tuff, and flow-banded spherulitic rhyolite (Fig. 1). The green tuff has a mild fabric defined by welded lithic fragments and is conformable to sub-parallel to flow-banding in the rhyolite. Well-preserved spherulites are common on both margins of the rhyolite flow with concentric and radiating crystal structures in a very fine-grained groundmass. The volcaniclastic rocks are in contact with the basement gneiss which is interpreted to be from the Hungry Mountain Complex. Sub parallel trending diabase dikes cross-cut all units, and are weakly deformed, locally pyritic and rarely host Cu mineralization (Fig. 1).

Copper sulfide mineralization at the Koorae prospect occurs predominantly as chalcopyrite (with lesser bornite and chalcocite). Chalcopyrite mineralization present in the green tuffaceous unit varies from disseminated in weakly altered samples to veinlet and breccia textured associated with stronger silicification. The best mineralization grading up to 3.7% (JNR Resources Inc. Press Release, Nov. 30, 2009) are found in these strongly altered tuffs. Mineralization within the flow-banded rhyolite occurs dominantly as disseminated chalcopyrite near the western spherulitic margin.

Alteration of the quartz-feldspar porphyry consists of pervasive fine-grained hematite +/- magnetite within its maroon groundmass making it weak to moderately magnetic. The green tuffs are well preserved and are generally weakly altered with the exception of the strong quartz-chlorite-altered tuffs found in locally derived boulders. Further petrographic and lithogeochemical work is required to fully document the alteration types and their extent at the Koorae prospect.

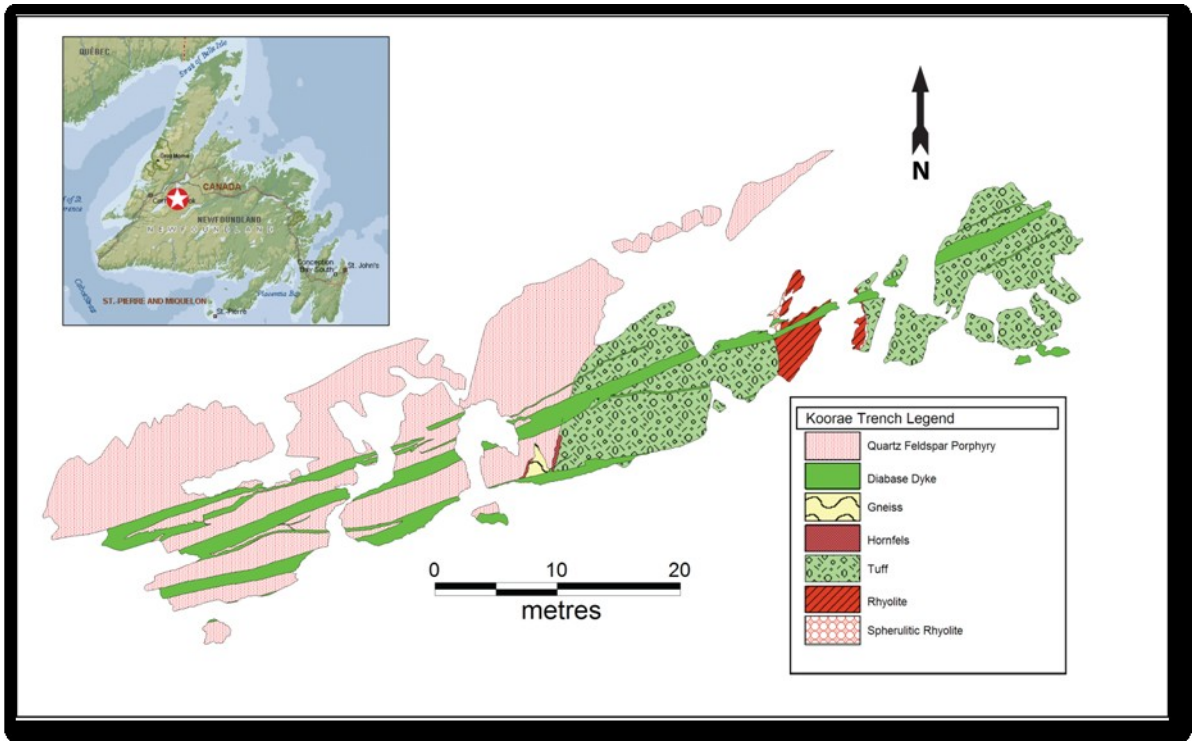

***Figure 1**: Detailed trench map of the Koorae Prospect*

Conclusions

The Koorae prospect represents alkalic porphyry-style Cu-Mo-Ag-Au mineralization within the TIS of west-central Newfoundland. The extent of copper mineralization at the Koorae prospect is limited to the present exposure of the trench and further work is required to document the broader extent of mineralization and alteration assemblages. Furthermore, in order to provide a more robust regional framework for copper mineralization within the TIS, the regional geology requires an integration of igneous rocks and stratigraphy using lithogeochemistry and U-Pb geochronology. The recent discovery of the Koorae prospect illustrates that the TIS has been underexplored and hosts potential for porphyry Cu-Mo-Ag-Au discoveries.

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