The Woodjam district is part of the Late Triassic to Middle Jurassic porphyry belt located in the Quesnel terrane in central British Columbia. It hosts several discrete porphyry deposits including the Takom Cu-Au, Megabuck Cu-Au, Southeast Zone Cu-Mo, Deerhorn Cu-Au, and Three Firs Cu-Au. Whereas the Southeast Zone is hosted at the western margin of the Takomkane Batholith and displays characteristics similar to calc-alkalic porphyry deposits, the remaining deposits are located <4 km west of the Takomkane batholith and are largely associated with alkalic porphyry intrusions.

The Southeast Zone (SEZ) deposit (227 Mt at 0.31% Cu) is hosted in texturally variable (coarse-, medium- and fine-grained) quartz monzonite intrusions of the Woodjam Creek sub-unit of the Takomkane batholith. The coarse/medium-grained quartz monzonite (CQM; 197.48±0.33 Ma) is cut by a fine-grained quartz monzonite body (FQM), hosting fewer quartz phenocrysts, and a K-feldspar porphyry (KP) intrusion. Alteration is zoned from intense K-feldspar+biotite+magnetite (K-silicate) in the center, which becomes weaker towards the margins and is fault-juxtaposed against albite alteration. Mineralization, largely hosted in CQM and FQM, is zoned from high chalcopyrite>pyrite at the center to pyrite-dominated at the margins. The Deerhorn deposit (32.8 Mt at 0.49 g/t Ag and 0.22% Cu) is hosted in a series of narrow monzonite dikes/units that have “pencil” shape geometries and intrude the volcano-sedimentary rocks of the Nicola Group. The main stage of mineralization is hosted in monzonite A (Monz-A: 196.34±0.19 Ma) and is cut by monzonite D (Monz-D). Alteration is characterized by intense K-feldspar+biotite+magnetite in Monz-A and adjacent host stratigraphy. Monz-D displays moderate to weak K-silicate alteration. Mineralization is mainly hosted in a sheeted network of quartz-magnetite-hematite-chalcopyrite veins.

Whole rock geochemical data of intrusive phases at the SEZ and Deerhorn show a trend of decreasing silica content, with higher Si members represented by coarse Takomkane phases at the SEZ, and lower Si member by the FQM and the Deerhorn Monz-A and Monz-D. This transition is also reflected temporally when combined with the crosscutting relationships and supporting isotopic ages. Heavy REE patterns show that CQM and KP have a negative Eu anomaly and enrichment on HREE. The Deerhorn deposit shows more depleted HREE (Yb and Lu) and a positive Eu anomaly, similar to the values of the FQM, suggesting that these intrusive units could be co-magmatic. The different geochemical signatures for both deposits could have occurred...
through magmatic comingling, due to the input of a Si depleted magma into a richer Si magma chamber that was crystallizing the CQM and KP bodies, or the crustal assimilation of a more mafic Nicola Group into the magma chamber. This magmatic comingling would have subsequently generated the FQM, Monz-A and D intrusions, and would have been important in the transition from SEZ calc-alkaline to Deerhorn alkaline type mineralization.